[STANDARD.]

THE

AMERICAN

ENCYCLOPÆDIA OF COMMERCE,

MANUFACTURES, COMMERCIAL LAW, AND FINANCE:

COMPRISING

DESCRIPTIVE AND STATISTICAL ACCOUNTS OF COMMODITIES, WITH CUSTOM-HOUSE AND INTERNAL REVENUE REGULATIONS, DUTIES, &c.

MANUFACTURING PROCESSES IN THEIR PRESENT STATE OF ADVANCEMENT.

COMMERCIAL STATISTICS OF THE DIFFERENT COUNTRIES OF THE WORLD, INCLUDING THEIR PHYSICAL CHARACTER, PRODUCTIONS, TRADE, COMMERCE WITH THE UNITED STATES, SEAPORTS, MONEYS, MEASURES, FINANCES, &c.

PATENT LAWS AND REGULATIONS, RAILROADS AND RAILROAD COMPANIES, INSURANCE AND INSURANCE COMPANIES, SHIPPING, WAREHOUSING, &c.

SUMMARY OF THE PRINCIPLES OF COMMERCE, FINANCE, AND BANKING, WITH STATISTICAL ILLUSTRATIONS.

DIGEST OF COMMERCIAL LAW, INCLUDING INSURANCE, PARTNERSHIP, PRINCIPAL AND AGENT, BILLS OF EXCHANGE SALE, GUARANTY, INSOLVENCY, SHIPPING, AND CONTRACTS AND OBLIGATIONS IN GENERAL.

COMMERCIAL ARITHMETIC AND ACCOUNTS, EXCHANGES, COINS, WEIGHTS AND MEASURES, INTEREST, ANNUITIES, &c. WITH NUMEROUS TABLES.

NATIONAL DEBT, NATIONAL BANKS, &c.

DEFINITION OF TECHNICAL TERMS USED IN COMMERCE AND IN THE MANUFACTURING ARTS; TOOLS, INSTRUMENTS, MACHINES, &c.; BESIDES A VARIETY OF MISCELLANEOUS INFORMATION.

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COLANGE'S

ENCYCLOPÆDIA OF COMMERCE.

J

Jabb, a net used in Scotland for catching the fry of coal-fish.

Jack, a sort of crane for lifting heavy weights. It consists of small pinions worked with a common winch. The pinion works in the teeth of a large wheel, on whose axis there is fixed a small pinion with teeth working in a rack. By turning the pinion, the rack is raised, and with it any weight attached to it. — The word is also applied to several other diverse contrivances, especially to those which answer in the place of another hand or of an assistant: thus, it signifies a horse or wooden frame to saw timber on; a kitchen machine for turning a spit, the moving power being either a weight or the smoke and rarefied air of a chimney; an instrument for pulling off boots, etc. — In sea-language, a Jack is a flag of colors, displayed from a mast at the outer end of the bowsprit of a ship, and used in making signals.

Jackassing, a term sometimes applied to labor done by men that is usually performed by horses or machinery.

Jack-Block, a block used in a ship when sending the higher masts up or down.

Jack-Boots, heavy, long boots for riding.

Jack-Cross-Tree, an iron cross-tree at the head of a long top-gallant mast.

Jacket, a short, close garment; a short coat.

Jack-Knife, a pocket whittling-knife with a large blade.

Jack-Ladder, in sea-language, a ladder with wooden steps and side ropes.

Jack-Plane, a smoothing plane about 18 inches long, used to prepare wood for the trying-plane.

Jackson, Lansing, and Saginaw R.R. runs from Jackson to Gaylord, Mich., 236 m. This Co., whose offices are in Jackson, was organized in 1865, and leased in 1871 to the Michigan Central R.R. at a rental of $70,000 and interest on the Co.'s bonds. It owns a land-grant, proceeds of sales of which are applied to payment of bonds. Capital stock paid in, $1,966,800; funded debt, 1878, $3,648,000.

Jacksonville. See FLORIDA.

Jack-Staff, a staff fixed on the bowsprit cap of a ship, upon which the Union Jack is hoisted.

Jack-Stays, ropes or strips of wood or iron stretched along the yard of a ship to bind the sails to.

Jack-Wood, an excellent furniture and fancy wood obtained from the *Artocarpus integrifolia:* the fruit of this tree is occasionally eaten.

Jacob's Ladder, a ship's ladder made of rope with wooden steps.

Jacob's Staff, an instrument used by surveyors in measuring height and distance when expedition and little accuracy are required. It was formerly used at sea for the same purposes as the astrolabe, although entirely different from it; called also *cross-staff*.

Jaconet, a light, open, and soft kind of fabric, rather stouter than muslin, used for dresses, neck-cloths, etc.

Jacquard-Cards, perforated patterns used in weaving figured fabrics.

Jacquard-Machine. See LOOM.

Jade, AXE-STONE, an ornamental stone, of which there appear to be two varieties, *common jade*, or *nephrite*, and *saussurite*, or *jade tenace*. Common *J.* consists chiefly of silica, magnesia, and lime. Its sp. gr. varies from 2.9 to 3.0; hardness 7.0. Its color is leek-green, passing into gray. It is very tough, and scarcely fusible before the blow-pipe. From its toughness it has been used for the blades of hatchets by the New-Zealanders and other savage nations. *J.* is much used in Turkey and Poland for the handles of knives, daggers, swords, etc.; and in India, ornaments and trinkets, delicately worked, are made of it. In China, the *J.* is of a whitish color, and is called *yu.* It is formed into vases, rings, and other articles. Such articles are very costly, on account of the extreme difficulty of working this refractory substance. *J.* is polished by carnelian, but it takes only a greasy, not a brilliant polish. Saussurite is a double silicate of magnesia, lime, and oxide of iron, with silicate of alumina; sp. gr. 3.2 to 3.4; hardness 5.5. Its color is greenish-white or ash-gray; its cleavage is in two directions, meeting at an angle of nearly 120°. Its lustre is pearly, resinous, or vitreous; it is extremely tough, and is fusible before the blow-pipe.

Jag, a small load of hay; a wallet; a notch.

Jagged, cut in a coarse manner.

Jaggery, Jagary, the Indian name for a coarse,

dark kind of sugar made from the sap of the cocoa-nut, the palmyra, the kittool, and other palms, and from the sugar-cane. It is often used to mix with lime as a cement in the East, and it takes a very fine polish.

Jagging-Iron, Jagger, a pastry-cook's small iron wheel mounted in a handle, and used for crimping or ornamenting edges of pies, cakes, etc.

Jagong, the Malay name for Indian corn.

Jalap [Fr. *jalap;* Ger. *Jalapp;* It. *sciarappa;* Sp. *jalapa*], the root of *Convolvulus jalapa*, a plant indigenous to Mexico. This root often weighs 50 lbs., but is divided into portions, and in commerce occurs in dried pear-shaped masses, which when good are hard, resinous, with a brown, shining fracture, and a nauseous smell and taste. It is often adulterated with portions of the root of white bryony, but these may be distinguished by their lighter color and less compact texture. Dried pears are also sometimes substituted for it. The excellence of *J.* depends on the quantity of resin it contains, as this is the part which composes the well-known drastic purgative. It is chiefly imported from Vera Cruz. *Imp.* free.

Jalousies, a name for Venetian blinds in the West Indies and in France.

Jam, a preserve of fruits boiled with sugar.— A thick bed of stones.

Jamaica, an island situated in the Caribbean Sea, about 90 m. to the S. of Cuba, between lat. 17° 45′ and 18° 30′ N., and lon. 76° 10′ and 78° 22′ W. It is the largest and the most valuable of the British West Indian Islands, being 140 m. in length and 45 in extreme breadth, containing an area of 4,256 sq. m., and a population, at the last census, of 506,154. It was discovered in May, 1494, by Columbus, who called it St. Jago. From the sea-level on all sides of *J.* a series of ridges gradually ascend towards the central ranges from which they radiate, dividing the large rivers, and attaining, in the culminating Western Peak of the Blue Mountains, an elevation of 7,335 feet. From these mountains at least 70 streams descend to the N. and S. shores, but with the exception of one (the Black River, and that only for small craft), they are not navigable. Excellent harbors are everywhere to be found. Most of the staple products of tropical climates are raised, and in this direction great improvement has taken place during the last few years. The chief trade of the island is with England. The chief industries are agriculture and the manufacture of rum, cotton fabrics, candles, and other commodities. The staples of export are sugar, rum, coffee, spices, and dyestuffs.

Kingston, the capital, principal port, and largest town of Jamaica, is situated on the S. coast, in lat. 18° N., lon. 76° 50′ W., 12 m. E. N. E. of Spanish Town, the former capital, on the slope of a branch of the Blue Mountains, and on the N. shore of a magnificent bay, which has a mean depth of 6 fathoms, and affords good mooring-ground for 1,000 vessels of the largest size. The bay is bounded S. by a long and narrow strip of land named the Palisades, on the extreme point of which stands Port Royal, the naval station; but the entrance is considerably narrowed by a sand-bank stretching in front of Fort Augusta, and the shelter is imperfect, owing to the lowness of the coast. The situation of this port between Europe and Central America has rendered it an important commercial entrepôt; but the climate is hot, and generally unhealthy for Europeans. Pop. 35,000.

Jamaica Pepper. See ALLSPICE.

Jamb, in nautical language, to squeeze tight. See JAMBS.

Jambee, a species of cane imported from China, having a stiff stem with large knots.

Jambon [Fr.], a ham; a gammon of bacon;— *jambon de Mayence*, a Westphalia ham.

Jambs, projections; the side or vertical posts of any opening in a wall, etc., which bear the pieces that discharge the superincumbent weight; as the posts of a door, the sides of a fireplace or window.

Jamdanee, a kind of muslin flowered in the loom.

James'-Powder, a medicinal preparation used in fevers, consisting of 38 per cent of antimonious acid and 62 of bone earth.

Jamestown and Franklin R.R. runs from Jamestown to Oil City, Pa., 51.10 m. This Co., whose offices are in Honeboro', Pa., was chartered in 1862 and the road opened in 1867. It is leased to the Lake Shore and Michigan Southern R.R. at a rental of 40% of the gross earnings. Cap. stock, $601,310.50; funded debt, 910,000, consisting of 1st mortgage 7% 30-year bonds, payable 1897, $410,000; 2d mortgage 7% 25-year bonds, payable 1894, $500,000.

Janapa, a name in Madras for the sunn hemp of India, *Crotalaria juncea*, which also furnishes a valuable fodder; gunny-cloth and cordage are made from it. See GUNNY-BAG.

Jangada, a sort of rude log, float, or raft used on the Brazilian coasts and rivers.

Janitor, a door-keeper.

Janker, a long pole on two wheels, used in Scotland for transporting logs of wood.

Jantong, the Malay name for a leaf of the plantain.

Japan, an empire consisting of a chain of islands lying off the E. coast of continental Asia, and extending S. E. and N. W. between lat. 31° and 48° N., and lon. 129° and 150° E. Enclosed between this chain of islands and the opposite coasts of Corea and Manchu Tartary is the Sea of *J.*, which communicates by means of straits with the Chinese Sea on the S., the Pacific Ocean on the E., and the Sea of Okhotsk on the N. To the E., *J.* has no nearer land than California, 5,000 m. off; the nearest part of China is about 420 m., and of Kamtchatka 270 m. distant. The term *Japan* is probably a corruption of the Chinese name, *Ji-pun-quo; i. e.* Kingdom of the Source of the Sun, or Eastern Kingdom. The Japanese name is Nippon, or Nihon; *i. e.* Sun-source. The empire consists of 5 large islands,— Nippon (or Hondo), Kiushiu, Shikoku, Yezo, and Karafto,— and of a great number of small islands. Nippon, the largest and most important of the group, and that which gives name to the whole empire, is about 800 m. in length, while its average breadth is about 100 m. Its form is that of a curve or crescent, with the concave side toward the main-land. S. of Nippon, and separated from it by a narrow channel, is the island of Kiushiu, about 200 m. in length and about 80 in average breadth. Lying N. E. of Kiushiu, and E. of the S. extremity of Nippon, is the island of Shikoku, about 150 m. in length by 70 in average breadth. It is separated from Nippon by a long strait, in some parts not more than a mile in width; and from Kiushiu by Bungo Channel, which is about 30 m. broad. N. of Nippon, and separated from it by the Sangar Straits, is the large island of Yezo, a conquest and colony of the empire. Its form is that of an irregular triangle. The S. portion of the island of Karafto, or Saghalien, which is separated from Yezo by the Strait of Perouse, and the three southernmost of the Kurile Islands,— Kunashir, Iturup, and Ourop,— belong to *J.* The small islands which surround these are generally rocky and barren, but occasionally rich and fruitful. The entire number of islands composing the empire of *J.* is estimated at above 1,000, and the area of the whole empire at

150,000 sq. m. The coasts are difficult of access, not only from the multitude of rocks and islets which beset the passages, but also from the severe gales which agitate these narrow seas more than any other part of the ocean. Several dangerous whirlpools also occur among the rocks. The system of government of the Japanese empire is that of an absolute monarchy. It was adopted in the year 1869, when the now ruling sovereign overthrew, after a short war, the power of the Tycoon, together with that of the principal Daimios, or feudal nobles, reducing the latter to the position of simple tenants of the vast estates in their hereditary possessions. The sovereign bears the name of Supreme Lord, or Emperor; but the appellation by which he is generally known in foreign countries is the ancient title of Mikado, or "The Venerable." The power of the Mikado is absolute and unlimited, in temporal as well as spiritual affairs. He acts through an executive ministry, divided, in imitation of that of France under Napoleon III., into eight departments, — of the Imperial House, of Foreign Affairs, War, Navy, Finances and the Interior, Justice, Public Instruction, and Ecclesiastical Affairs. At the side of the Ministry stands the *Sain*, or Senate, composed of 30 members, and the *Shoïn*, or Council of State, of an unlimited number of members, both nominated by the Mikado, and consulted by him at his pleasure. There exists no regular law of succession to the throne, but in case of the death or abdication of the Mikado, the crown devolves generally, not on his son, but on either the eldest or the most distinguished member of his house. It is not uncommon that palace intrigues settle the choice, the only condition of legality of which is, that the elect should be member of the Shi Shinnô, the "Four Imperial Relatives," or "Four Royal Families" of *J.* The throne can be, and has frequently been, occupied by a female, who, however, is not allowed to remain single, but must seek a consort within the limits of the Shi Shinnô. The government is at present organized on a basis which is partly European. The Mikado is, theoretically, an absolute sovereign, who reigns and governs; but the work of government is carried on by the Great Council, which is divided into three sections, denominated Centre, Right, and Left. The Centre is composed of the Prime Minister, Vice-Prime Minister, and five advisers. The Left is made up exclusively of the Council of State, the functions of which are analogous to those of the French Conseil d'Etat, so far as the preparation and discussion of laws is concerned. The Right includes all the Ministers and Vice-Ministers of the eight departments into which the administration is divided. The Ministers, either individually or united in a cabinet, decide all ordinary questions; but points of real importance are reserved for the Great Council, presided over by the Mikado. The local administration in the provinces is in the hands of prefects, one of them residing in each of the 75 districts into which Japan is divided. The powers and the attributes of these prefects are far more extensive than those of any similar functionaries in Europe. There is, however, a limit to their judicial action, for they cannot carry into execution sentences involving banishment or death until they have been confirmed by the Minister of Justice. — Tokio (formerly called Yedo), the capital of the empire, lies on both sides of the Sumida River and on the bay of Yedo, in lat. 35° 40′ N., lon. 139° 40′ E. Its population in 1875 was 780,621. The following table gives the area and population of the several islands comprising the empire of *J.*: —

Islands.	Area in sq. miles, official calculation. 1877.	Population. 1875.
Niphon	86,773	25,478,834
Kiushiu	14,956	4,986,613
Shikoku	7,036	2,484,538
Iki, Tsushima, Awadji, Oki, Sado	1,002	362,177
Japan Islands	109,767	33,312,162
Jesso and Kuriles	36,006	144,069
Liukiu Islands	808	167,073
Bonin Islands	32	75
Adjacent islands	36,846	311,217
Total Japanese Empire	146,613	33,623,379

The surface of the principal islands is in general very irregular, though in the interior some plains of considerable extent occur. In many places hills descend close to the seashore, or leave only a narrow strip of land between the water and their bases. The highest mountain is said to be Fusi, an extinct volcano, on the island of Nippon, westward of the bay of Yedo. Its summit is clad in perpetual snow, thus indicating a height of not less than 12,000 feet above the level of the sea. Several mountains of considerable elevation are seen to rise in the N. part of Nippon, in Yezo, and in Karafto, and some of them are active volcanoes. Besides the outbursts of frequent volcanic eruptions, no country is more frequently visited by destructive earthquakes. The rivers are numerous, but short, shallow, and rapid. They are not navigable for vessels of burden, but some of them may be ascended by small boats for some miles from the sea. The climate of *J.* varies considerably between its northern and southern extremities. In the southern part of the empire it resembles that of our Atlantic seacoast States, though it is not so changeable as the latter. At Yokohama the average temperature in the month of January is 35°, and in August 80°. — *J.* is rich in gold, silver, copper, quicksilver, tin, lead, iron, coal, sulphur, petroleum, and salt. Gold is found in many parts of the empire, sometimes as ore, and sometimes from the washings of the earth or sand. Silver is equally plentiful with gold. Copper abounds through the whole group, and sometimes of a quality not to be surpassed by any in the world Iron ore rich enough for the purpose of smelting appears to be confined to three provinces, and the metal is consequently dear. Bituminous coal of an inferior quality is dug in many parts of the country, and is used for fuel, but coal is largely mined in Yezo, Amazura, Karatsu, and near Nagasaki, and sold for the use of steamers. No diamonds have been found, but agates, carnelians, and jaspers are met with, some of them of great beauty. Pearls, frequently of great size and beauty, are fished up on nearly all parts of the coast. — The vegetable productions of *J.* are, for the most part, those common to temperate regions. Timber is, however, so scarce, that no one is allowed to cut down a tree without permission from the magistrate, and only on condition of planting a young one in its stead. The most common forest trees are the fir and cedar, — the latter growing to an immense size, being sometimes more than 18 feet in diameter. In the N. parts of the empire two species of oak are found which differ from those of Europe. The acorns of one kind are boiled and eaten for food, and are said to be both palatable and nutritious. The mulberry grows wild in great abundance, and the varnish-tree (*Rhus vernix*) abounds in many districts. In the S., the bamboo cane, though a tropical plant, is found either in the wild or cultivated state, and is largely used in the manufactories. The camphor-tree is of great value here, and lives to a great age. The country people make the camphor from a decoction of the root and stems cut into small pieces. Chestnut and walnut trees are both found. Among the fruit trees are the orange, lemon, fig, plum, cherry, and apricot. — The shallow bays and creeks around the islands swarm with shoals of fish, which, indeed, constitute nearly the whole animal food of the Japanese, and furnish them plentifully with oil for domestic purposes. The Japanese are the boldest and most expert of all Asiatic fishermen. Their fishing voyages extend to the rigorous seas of Saghalien and Kuriles in pursuit of herring, with which they manure their cotton-fields. They are the only Asiatic people that pursue the whale.

Agriculture. The Japanese, being chiefly dependent on the soil for subsistence, have arrived at a high state of perfection in the arts of agriculture. Though a great part of the country is hilly or mountainous, and the soil in general rather poor, yet almost every available foot of land is cultivated, and very abundant crops are raised. Where the land is inaccessible to the plough it is cultivated by manual labor. Like the Chinese, they pay great attention to manuring and irrigation. As animal food constitutes hardly any part of their subsistence, no pastures or meadows are to be seen. Rice constitutes the main

object of agriculture, as it forms the bread-corn of the people from one end of the empire to the other. Its cultivation extends to the island of Yezo, and as far north as 45° of latitude. The rice of *J.* is known to excel that of every other part of Asia, and this may not be owing exclusively to its skilful cultivation, but partly to the climate and the distance of *J.* from the tropics. From it the inhabitants distil a drink called *saki* (a kind of rice beer), in very general use. Wheat and barley are grown, but the former is not in much use, and the latter is the chief provender of cattle. Rye, maize, panic, millet, and the *Cynosurus cororanus* are also raised. Beans and peas of different kinds are cultivated in great abundance, particularly the bean *Dolichos soja*, from which *soy*, a kind of sauce prepared by boiling and fermentation, is made. Among esculent roots and pot-herbs the following are successfully cultivated: the bata, the potato, carrot, turnip, cabbage, radish, lettuce, gourd, melon, and cucumber. The fruits are generally those of Europe, as the orange, lemon, peach, fig, pear, chestnut, walnut, and cherry. The tea shrub is one of the most useful plants growing in *J.*, and yet, excepting some places where the plant received more attention, it was allowed no other room but round the borders of rice and corn fields, and in other barren places unfit for the culture of other things; but since the opening of the country an immense number of tea plantations have been set out. The teas of Uji and Suruga are considered the best. The plants cultivated in *J.* for textile purposes are cotton and hemp in the northern islands. The mulberry is grown for the silk-worm. In husbandry cotton ranks next in importance to rice, and furnishes materials for clothing the great mass of the people.

Manufactures. In the manufacture of cotton fabrics the Japanese display considerable skill, but in this respect they do not equal the Hindoos. Their best silk is superior to that of China. In the manufacture of porcelain, too, they are said by some to excel the Chinese. Specimens of great beauty and delicacy, at least, have been produced, though some assert that, owing to the exhaustion of the best clay, such articles can no longer be manufactured. Like the Chinese, the Japanese have long practised the manufacture of paper and glass. Formerly they did not know how to make the flat pane for window-glass, and probably what they do make is of an inferior quality, as they still purchase thick mirror-glass from the Dutch, to grind into lenses. Paper they manufacture in great abundance, as well for writing and printing as for tapestry, handkerchiefs, etc. It is made of many different qualities, and some of it is as soft and flexible as cotton cloth. Indeed, that made of the bark of the mulberry (*Morus papyrifera*), and used for handkerchiefs, might be mistaken for cloth, so far as toughness and flexibility are concerned. The well-known lacquer-ware to which *J.* has given name is unequalled for beauty and durability by that of any other nation. We have ourselves of late years imitated, but certainly not equalled it. They display considerable skill in working the metals. In wood-work, caskets, cabinets, and the like, they are unsurpassed. They are exceedingly quick in observing any improvement brought in among them by foreigners, and copy it with great skill and exactness. Clocks, watches, and astronomical instruments are made by them, copied from European models. Nearly every kind of manufacture is carried on at Tokio, and shops filled with foreign articles are found in all large towns.

Commerce. The Japanese carry on a very large internal traffic, which, from the peculiar characteristics of their country, is in a great measure by coasting. The numerous straits and creeks, with their shallow waters, though generally unfit for ships of burden, are sufficiently commodious for the small craft of the Japanese, which rarely exceed 60 tons burden. The foreign intercourse of *J.* was, for more than two centuries, solely confined to the Dutch and Chinese. Even with these the trade was limited, being with the Dutch for a considerable time restricted to a single ship annually, and with the Chinese to ten junks. The exports and imports were even limited as to value, and the sales and purchases fixed by a tariff of the Japanese government. The Dutch were confined to the small island of Dezima, in the harbor of Nagasaki, which is only about 640 feet in length by 240 in extreme breadth. A small stone bridge connects the island with the town of Nagasaki, and a strong Japanese guard was always stationed here, no one being allowed to pass either to or from the island without license. In 1854 American diplomacy succeeded in removing the barriers against foreign commerce. By treaties made with the U. States in March, 1854; with Great Britain in October, 1854; with Russia and the Netherlands in 1855; with France in 1859; with Portugal in 1860; with Prussia and the Zollverein in 1861; with Switzerland in 1864; with Italy in 1866; and with Denmark in 1867, the Japanese ports of Kanagawa (Yokohama), Nagasaki, Kobe, Hiogo-Osaka, Hakodate, Niigata, and the city of Tokio (Yedo), were thrown open to foreign trade and residence. Foreigners, whether residents or visitors, can now travel unrestrictedly throughout the country under passports, which can be had on application at the different consulates; but trading in the interior by foreigners is rigorously prohibited. The chief imports of *J.* are cotton yarn, shirtings, muslins, velvet, chintzes, and other piece-goods; metals, drugs, and medicines are also among the imports. Sugar is largely imported for China. The chief exports are tea (the whole of which comes to this country), silk, silk-worms' eggs, cocoons, lacquer-ware, copper, camphor, and dried fish. The foreign commerce of *J.* in the years 1868 and 1873-1876 was as follows: —

Years.	Imports.	Exports.	Excess of	
			Imports.	Exports.
	$	$	$	$
1868......	10,693,071	15,553,472	....	4,860,407.
1873......	28,107,390	21,632,140	6,475,250	....
1874......	23,461,814	19,315,064	4,146,750	....
1875......	29,975,627	18,611,110	11,364,517	....
1876......	23,964,678	27,711,527	....	3,746,849

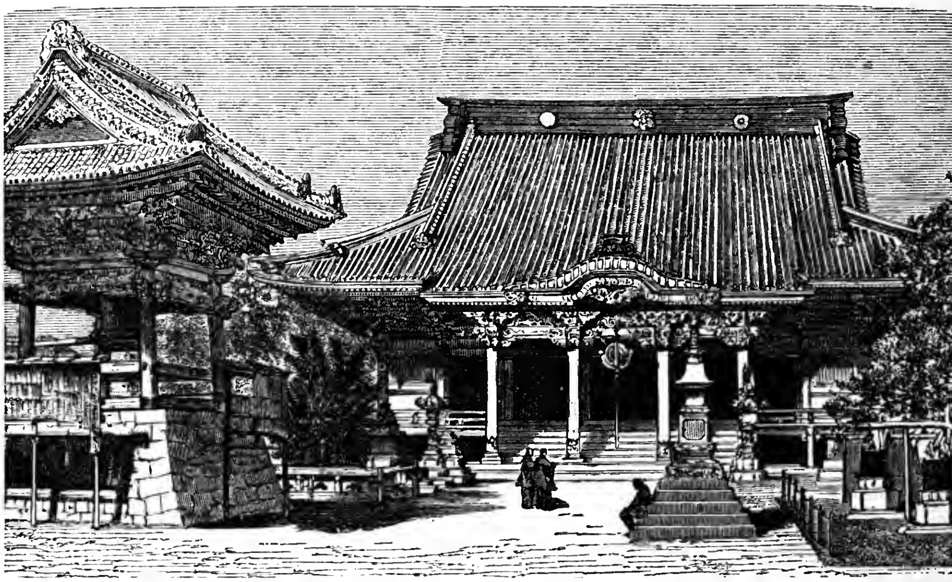

Fig. 294. — Japanese Country-Seat.

The commercial intercourse of *J.* is carried on mainly with Great Britain, China, the U. States, and France. For the year 1876 the exports to Great Britain, chiefly consisting of raw silk, amounted to $3,285,725; and the imports, mainly consisting of cotton goods, woollen fabrics, and wrought and unwrought iron, to $10,163,425.

The following table exhibits the commerce of *J.* with the U. States for the 20 years from 1859 to 1878: —

Fig. 295. — View on Kusnayara River (Kiushiu Island).

Year ended June 30 —	Imports from the U. States.		Exports to the U. States.	Total Imports and Exports.
	Domestic.	Foreign.		
	$	$	$	$
1859........	....	....	295	295
1860........	89,856	48,918	55,091	193,865
1861........	14,876	25,677	102,566	143,119
1862........	35,348	87,602	87,513	210,463
1863........	161,266	52,671	73,851	287,788
1864........	38,434	11,706	270,587	320,727
1865........	42,769	22,000	285,176	349,945
1866........	472,551	60,221	1,815,364	2,348,136
1867........	690,136	109,972	2.618,487	3,418,595
1868........	780,168	85,872	2,429,182	3,295,222
1869........	2,836,720	1,119,341	3,245,317	7,201,378
1870........	915,665	614,049	4,183,365	5,713,079
1871........	987,675	642,666	5,387,991	7,018,332
1872........	4.362,289	123,977	9,174,243	13,660,509
1873........	7,664,058	401,667	9,253,374	17,319,099
1874........	1,808,107	61,040	6,489,370	8,358,517
1875........	1,647,197	14,736	7,772,302	9,434,235
1876........	1,098,457	3,309	15,508,170	16,609,936
1877........	2,539,641	385,243	13,689.433	16,614,317
1878........	2,770,272	3,612	7,541,625	10,315,509
Total.....	28,955,485	3,874,279	89,983,302	122,813,066

The value of the principal articles of imports from, and exports to, the U. States for the year 1878 was as follows: — *Imports:* agricultural implements, $6,824; pot and pearl ashes, $5,020; books, etc., $19,918; brass (manuf.), $24,748; wheat flour, $54,030; clocks, $95,611; cordage. etc., $8,681; cotton goods, $50,052; drugs, etc., $46,474; fancy articles, $6,604: glass and glass ware, $29 006; silver bullion and coin, $427,057; hides, $22.384; india-rubber goods, $7,943; iron (manuf. of), $37.931; fire-arms, $23,517; lamps, $7,935; lead, $12,312: leather, $128,537; mineral oil, $1,305,713; cartridges, $91,101; paper and stationery, $17,375; butter, $23,246; milk (condensed), $21.252; quicksilver, $20,551; scales, $7,530; soap, $6,418. — *Exports:* fur skins, $64,858; gold and silver coin, $95,078; raw silk. $831 353; tea (23,938,734 lbs.), $5,497.171; china ware, $87,047; fancy goods, $180,823; paper, $16,672; silk (manuf. of), $19,498; cabinet ware, etc, $94,988.

Railroads, Telegraph, and Post-office. The first line of railroad, from Hiogo to Osaka, 25 m. long, was opened on the 12th of June, 1875. At end of 1878 there were opened for traffic 66½ m. of railroad, 142 m. in course of construction, and 455 additional miles sanctioned by the government. The ports of Hiogo, Osaka, Nagasaki, and Hakodate are connected with each other, and with Europe, by lines of telegraphs. At the end of 1878 there were in *J.* telegraphs of a length of 1,838 m. The number of telegrams carried during the year was 410,150 The post-office, first established in 1871, after American model, carried 22,659,784 letters, 6,764,272 post cards, and 7,372.536 newspapers in 1878. The charges for letters are 1 cent in all the large towns, and 2 cents for the rest of the empire, while post cards are sold at one half these prices. The revenue of the post-office in 1876 amounted to 595,201 yen, and the expenditure to 713,244 yen. There were 2,354 post-offices in *J.* in 1878.

Finances. Since the year 1875 regular accounts of public receipts and expenses have been issued by the government, and though only, as yet, in the form of estimates, they are believed to be very correct. The sources of revenue and branches of expenditure for the year 1878 were given as follows: —

Receipts.	Yen
1. Ground tax	38,538,794
2. Tax on alcoholic liquors	2,412,029
3. Mining dues, stamp dues, patent dues, postage stamps, etc..............................	2,105,776
4. Customs duties..............................	1,767,139
5. Income tax	79,251
6. Tobacco tax...............................	324,280
7. Tribute of the Liukiu Islands................	46,656
8. Taxes on the products of the northern provinces	377,576
9. Receipts from mines	1,024,680
10. Railroads	811,327
11. Telegraphs..................................	208,020
12. Receipts from various manufactures, etc.....	377,707
13. Mint	770,800
14. Public lands	890,086
15. Miscellaneous receipts	377,551
16. From sums due to the government...........	1,144,767
Total..................................	51,256,439

Expenditures.	
1. On account of public debt...................	17,581,046
2. Civil list, appanages.........................	873,500
3. Pensions....................................	282,705
4. Council of State.............................	292,500
5. Senate and Provincial Assemblies............	146,300
6. Ministry of Foreign Affairs..................	175,500
7. " of the Interior......................	1,602,100
8. " of Finances.........................	1,538,110
9. " of War............................	5,850,000
10. " of the Navy.	3,217,500
11. " of Education	1,170,000
12. " of Public Works	2,925,000
13. " of Justice	1,248,000
14. " of the Imperial House..............	273,000
15. Colonization................................	1,457,100
16. Land-tax reform	146,300
17. Provincial administration....................	3,823,220
18. Postal administration........................	1,049,000
19. Police..	2,001,746
20. Police, temples...............................	180,600
21. Public buildings, canals, etc.................	1,966,500
22. Ambassadors and consuls.	500,000
23. For the support of the poor and the promotion of industry..............................	500,000
24. Miscellaneous	376,722
25. Unforeseen expenses.........................	2,080,000
Total expenditure......................	51,256,439

The public debt of *J.*, at the end of June, 1877, amounted to 363,826,661 yen, made up as follows: —

1. Home debt: —

	Yen.	Yen.
Bearing interest at 4 per cent..	11,450,950	
" " 5 " ..	46,174,165	
" " 6 " ..	27,056,195	218,903,465
" " 7 " ..	109,454,155	
" " 8 " ..	16,204,725	
" " 10 " ..	8,563,275	
Bearing no interest		9,868,465
Paper money		121,054,731
		349,826,661

2. Foreign debt: —

Bearing interest at 9 per cent..	2,440,000	13,399,016
" " 7 " ..	10,959,016	
Total public debt		363,225,677
From this amount should be deducted		
Reserve fund		39,031.538
Outstanding loans		8,067,295
Debt not provided for		316,126,844

To the home debt there was added a loan of 12,500,000 yen, issued in August, 1878, for developing the resources of the country. The foreign debt of *J.* was raised in England. It comprises a 9 per cent loan of £1,000,000 issued in 1876, and a 7 per cent loan of £2,400,000 contracted in London, at the price of 92½, in January, 1875. This total of £3,400,000 had been reduced, by the action of a sinking-fund, to £2,679,803 at the end of June, 1878.

Money, Weights, and Measures in common use at the open ports of *J.*, and the American equivalents, are: —

MONEY.

The *Ichibu* (silver), about $0.34	1*s.* 4½*d.*
" *Yen*, or *Dollar*, rate of exchange	$0.997

The gold yen, the unit of account, very slightly differs, as to the quantity of gold contained in it, from the quantity of gold contained in the standard gold dollar of the U. States. The Chinese system of taking money only for its strict metal value, and using it indiscriminately, either whole or in pieces, exists also in *J.*; but, unlike the Chinese, the Japanese have national coins. These coins were made out of the country until the latter part of 1870, when the government purchased at Hong-Kong the complete machinery of a mint, and set it up at Osaka, in a building constructed for the purpose. The new coinage issued from this mint consists of gold 10, 5, and 2½ dollar pieces, equal to Mexican dollars in shape, weight, and fineness; of silver dollars, and 50, 20, and 5 cents; besides copper 1 and ½ cents and 1 mil, the latter said to be the smallest modern coin. They are made of iron, copper, silver, and gold, and an alloy of gold and silver, and are of different shapes, — rectangular, square, circular, and oval. There is also a paper currency, consisting of bank-notes of one-quarter, one-half, and one *Riô*.

WEIGHTS AND MEASURES.

The *Picul*, or *ton*	=	133 lbs. avoirdupois.
" *Kin* = 160 *momme*	=	1⅓ " "
" *Shaku* = 10 *sun*	=	11¾ inches.
" *Ri* = 36 *chô*	=	2½ miles.
" *Chô*, land measure	=	2½ acres.

It is stated to be the intention of the government to introduce into *J.*, at an early period, a new system of weights and measures, based on the decimal system of France.

Seaports. The principal ports opened to foreign commerce are here given in their alphabetical order: —

Hakodate, or ***Hakodadi***, the most northerly of the Japanese treaty ports, is situated in the island of Yeso, lat. 41° 47′ 8″ N., lon. 140° 45′ 34″ E. It is an excellent harbor, having good anchorage in black mud, in about 5 to 6 fathoms water, and had been frequented by whalers before the opening of the Japanese islands to American commerce. The population is reckoned at about 10,000. The chief exports are hides and deer horns, porcelain, and tow. In 1877 this port was visited by 28 vessels, of which 6 (aggregate tonnage 1,426) were American. The imports, for the same year, amounted to $1,058,000, and the exports to $1,752,000. Pop. 10,000.

Hiogo, a seaport town of the island of Nippon, on the Bay of Osaka, about 20 m. W. of the city of Osaka, of which it is the port. It is the best harbor of *J.*, and its opening to foreign trade gave rise to great commercial activity. Only one American vessel visited it in 1867. The imports for that year amounted to $5,175,000, and the exports to $3,924,000. Pop. 20,000.

Nagasaki, a seaport town on the S. W. coast of the island of Kiushiu, in lat. 32° 43′ 40″ N., lon. 103° 11′ 47″ E. The harbor is one of the finest in the world. It is about a mile in width, and three or four in length. When one is inside it appears to be completely landlocked, and to be an inland lake. The hills around it are about 1,500 feet high. Ships lie in 5 or 6 fathoms water, within gunshot of the town, near the middle of the bay, where they are protected from all winds. It is the chief depot of the trade with China, and the mart for the potteries of Hizen; but the lack of good land approaches hinders its growth. The exports to America and Europe are tea, tobacco, camphor, and porcelain. 238 foreign vessels visited this port in 1877, of which 39 (tonnage 3,443) were American, and 103 (tonnage 50,101) were English. The value of imports for the same year was $1,058,000, and of exports $1,752,000. Pop. 80,000.

Yokohama, a seaport town of the island of Nippon, on the S. side of a bight of the Bay of Yedo, 17½ m. S. by W. from Tokio, with which it is connected by railroad; lat. 35° 26′ N., lon. 139° 39′ E. The harbor is deep and capacious, and the climate very salubrious. Yokohama was a mere fishing village until 1859, when it was made the foreign mercantile settlement of Tokio. Its growth has since been very rapid. The streets are well paved, drained, lighted with gas, and lined with richly stocked shops, hongs, and silk-warehouses. It is the great mart for all the native produce and manufactures of *J.* Eight lines of steamers call at Yokohama. The imports in 1877 amounted to $19,878,000, and the exports to $21,383,000. During the same year 214 foreign vessels visited the ports, of which 38 (tonnage 120,372) were American, and 115 (tonnage 136,466) were English. Pop. 60,000 (including about 1,500 Americans and Europeans).

Japan, a varnish for metallic and other articles, made of linseed-oil, umber, and turpentine; another kind is made of seed-lac and spirits of wine, with a coloring substance added.

Japan Earth, Terra Japonica. See GAMBIER.

Japanned Leather, enamelled or varnished leather prepared with several coatings of a mixture consisting of linseed-oil, Prussian-blue, and lamp-black, rubbed in with the hand and then dried in a stove.

Japanned Wares, articles of every description, such as tea-trays, clock-dials, candlesticks, snuff-boxes, etc., covered with coats of Japan, whether plain, or embellished with painting or gilding. They are chiefly made at Birmingham and Wolverhampton, in England.

Japanner, a varnisher; one who lays a japan upon substances.

Japanning, a species of lac-varnishing, in imitation of the lacquered ware of Japan, which, with that of China, is esteemed the best in the world. The ware may be lacquered upon wood, metal, or papier-maché grounds.

A description of the process as practised in China may serve to explain the sources of superiority. The article, if of wood, being made very dry, light, and smooth, is primed with a mixture of gall and rotten-stone, which is rubbed smooth before the varnish is applied. The varnish is composed of 605 grains of gum-lac in 1,200 grains of water, to which are added 38 grains of oil of pig's gall (*Camellia sasangua*), and 19 grains of rice vinegar. The ingredients are well mixed in full daylight, when the varnish gradually deepens into a brilliant black. A very thin coat of this varnish is applied with a flat hair brush. The article is left in a steaming heat, and is then rubbed down in water with very fine pumice. A second coat of lac-varnish is next applied, and the polishing is repeated, which two operations are continued until a perfectly even and brilliant surface is attained, a finer quality of lac being used for the later coats, of which there are never less than three nor more than eighteen. The object is ornamented by an artist, who draws the design in white lead, engraves it, and fills up the details. The article is next painted with a camphorated lac, which serves as a basis for the gilding. It is completed by varnishing. — In our method of *J.* the wood intended for the best works is thoroughly dried, since any warping or shrinking would be fatal to the finished surface; for which purpose well-seasoned wood is cut nearly into the required forms, and exposed for several days to a gradually increasing heat in the japanner's stove. — The articles are then finished as to form, and are again stoved, after which the cracks are stopped with putty or white lead. For black japanned works a ground of ivory-black mixed with dark-colored animé varnish is applied. This is dried in the stove, and coated with varnish three or four times, the work being stoved between every two coats. For colored grounds the varnish mixed with the proper color is laid on in one or two coats, and the work is completed by several successive varnishings and dryings. Ordinary painters' colors ground with linseed-oil or turpentine, and mixed with animé varnish, are employed for various black or brown surfaces with gilt edges, imitations of marble, fine-grained woods, tortoise-shell, etc. The colors mostly used are flake-white, or white

lead, Prussian-blue, vermilion, Indian-red, king's yellow, verdigris, lamp-black, and the various tints produced by their admixture. The varnishes used are copal, seed-lac, animé, and mastic. The lac-varnish is the best for hardness, but its color prevents its use for delicate grounds, so that for such purposes it is either mixed with gum varnish, or copal varnish is used instead. Copal or animé varnish made without driers is applied, in from two to six coats, after the color has been laid on. — Japanners sometimes use a priming of size and whiting, which is laid on with a brush, and left for a day or two to dry; it is then made smooth by rubbing with rushes and a wet cloth. When this is quite dry, the grounds are laid on, and finished by varnishing and polishing with rotten-stone, or, in the case of a white ground, with putty or starch, and oil. It must, however, be remarked, that a priming, or artificially prepared ground, is objectionable, the japanning being more liable to crack than when executed on the actual surface of the object itself. A gold ground is formed by varnishing the work with japanner's gold-size, and when nearly dry, but still clammy, covering it with gold-dust applied on a piece of wash-leather; the effect of such a ground when highly varnished is very brilliant. Japan work is ornamented with drawings or engravings, on the principle of transfer, for which purpose the engraving is printed, or the drawing executed, on fine paper previously prepared with a coat of isinglass or gum-water. When this is dry it is placed face downward upon the japan ground, which is covered with a thin coat of copal varnish. A sponge dipped in warm water is then applied to the back of the paper, which dissolves the isinglass, loosens the paper, and leaves the print on the work. Another method is to execute the print on an elastic composition of glue, etc., which receives the impression well, and can be laid down at once on the japanned surface. The whole of the processes require so much drying, that stoves are requisite to hasten the work. — The great demand for *J.* is for works in *papier-maché*, to which article we must refer for further information on the subject. Common articles of furniture are sometimes said to be japanned, thereby implying that they are more durable than common painted articles. The term as thus used is, however, incorrect, since the colors employed on such common works are only mixed with turpentine instead of oil. For *J.* works in metal they are cleaned with turpentine to get rid of grease or oil, unless the oil should be linseed, in which case the articles are stoved until the oil becomes quite hard. *J.* is then performed in the usual manner.

Japan Wax. See WAX.

Jar, an earthenware or glass pot or vessel with a large belly and a broad mouth, and of variable dimensions.

Jardinier [Fr.], a gardener.

Jaree, a name in Hindostan for the jujube fruit.

Jargon, a gem, the mock diamond, constituting a variety of zircon, and found at Ceylon.

Jargonelle, a large and esteemed kind of pear. — An essence obtained from fusel-oil.

Jasmine-Oil, a yellowish essential oil obtained from the flowers of several species of jasmine. The genuine oil of jasmine of the shops is the produce of *Jasminum grandiflorum* and *officinale*, but a similar perfume is obtained from *J. sambac.*

Jasper, a species of quartz, apparently colored by iron; a precious stone, nearly as hard as agate, which occurs of many colors and varieties. The ancient arrow-heads, spear-heads, and other Indian implements of stone for use in war or in the chase were chiefly formed of native blood-red jasper, exceedingly fine and hard, and oftentimes emulating the appearance of the semi-pellucid gems.

Jatal, a Brazilian name for the locust-tree. *Hymenæa courbaril.*

Jatropha-Oil. See PHYSIC-NUT.

Jatte [Fr.], a porringer; a wooden bowl.

Jaunting-Car, a light car used in Ireland.

Java, a noble island belonging to Holland, the first in importance, although only the third in magnitude, of the islands in the Indian Archipelago, lies between lon. 105° 12′ and 114° 4′ E., lat. 5° 52′ and 8° 40′ S. It is the most fertile and prosperous tropical island in the world. In form it is long and narrow, being 666 m. in length from E. to W., by from 55 to 133 m. in breadth. Area (including Madura), 51,336 sq. m. The population, which in 1816 was only 4,615,270, amounted to 18,520,408 in 1877, including 28,121 Europeans, and 193,594 Chinese. *J.*, the most important of the colonial possessions of Holland, is administered, politically and socially, on a system established by General Johannes Van den Bosch in 1832, and known as the *culture system.* It is based in principle on the officially superintended labor of the natives, directed so as to produce not only a sufficiency of food for themselves, but the largest quantity of colonial produce best suited for the European market. To carry out the culture system, there exists a complicate machinery of government, the functions of which descend into the minutest details of administration. Formerly, the culture system comprised the forced labor of the natives, employed in the cultivation of coffee, sugar, indigo, pepper, tea, tobacco, and several other articles. At present, the labor of the natives is only required for the produce of coffee and sugar. By the terms of a bill which passed the legislature of the Netherlands in 1870, the forced cultivation of the sugar-cane will be totally abolished in 1890. The governor-general represents not only the executive power of government, but he has the right of passing laws and regulations for the administration of the colony, so far as the authority is not reserved to the legislature of the mother country. *J.* produces, for the benefit of Holland, a large surplus revenue, after paying for its own government. The local revenue is derived from taxes on real estate, from licenses, customs duties, the government monopolies of salt and opium, etc.; but the chief portion of the large profits derived from *J.* is indirect, being obtained by the sale of a vast amount of colonial produce, grown under the culture system, and sold to India, Europe, and America. The total revenue for the year 1877 amounted to 146,666,146 guilders, and the expenditure to 136,691,274 guilders. About one third of the annual expenditure is for the comparatively large army and navy, which are necessitated by the peculiar system of government of the colony. Batavia, the capital of *J.*, is connected by a railroad, 36 m. in length, with Buitenzorg, the country-seat of the governor-general.

To the N. W. the island is parted from Sumatra by a strait, at its narrowest part only 14 m. wide, and with islands between; and to the E. from Bali, by a strait of no more than 2 m. broad. On its low, and in some measure sheltered N. coast, *J.* has a good many islands, by far the largest and most important of which is Madura, separated from it by a strait at one part only about 1 m. wide. On the bold, precipitous S. coast there are very few islands, and only two of a considerable size, Baron and Kambangan. The coast-line of *J.*, which is about 1,400 m. in extent, has many bays on its N. coast, but it is not deeply penetrated by any one of them, so that it has properly no harbor but one, that of Surabaya, formed between the main island and Madura, where the strait that divides them is very narrow. The S. coast is still less indented. Here there are two harbors only, Pachitan — inconvenient and unsafe — and Chalachap, formed between the main island and Kambangan, both out of the way of intercourse and little frequented. On other parts of the S. coast there is no safe anchorage, while dangerous surge rolls in on the shore in all seasons. With the single exception named, the ports of the N. coast are but open roadsteads, with good anchoring ground; but the want of land-locked harbors is not felt so near the equator, where hurricanes are never experienced, and where the weather is only occasionally tempestuous at the change of the monsoons.

Most part of the surface of *J.* is mountainous. A mountain-chain, obviously of volcanic origin, runs W. and E. entirely through the centre of the island; its peaks varying in elevation from 5,000 to probably 12,000 feet. The S. coast is usually bold and rocky, and is generally unsafe for shipping; the N. shore is, on the contrary, low and marshy, and has many tolerable harbors and roadsteads. Rivers numerous, but very few of any size. The largest is the Solo (Fig. 296), running through nearly the centre of the island, and disemboguing on the N. coast, opposite Madura. Its length may be estimated at 400 m., seven eighths of which are navigable for vessels of 200 tons. There are many extensive swamps, and in the mountains numerous small lakes occupy the craters of extinct volcanoes. Metals are few. Mineral springs of various kinds are met with, besides naphtha and petroleum wells. — The seasons are divided into the *wet* and *dry*. The former accompanies the monsoon from October to March or April; the latter, the E. monsoon, which lasts during the rest of the year. On the N. coast, where the thermometer sometimes rises to 90° F., the climate is very unfavorable to Europeans; but in the interior, at an elevation of 4,000 feet, where the temperature ranges between 50° and 60°, no deleterious influence is to be apprehended from atmospheric conditions. Earthquakes are frequent, but thunder-storms are unknown. — *J.* has a most luxuriant vegetation. It is distinguished by the variety and superior excellence of its fruits and other vegetable products, which comprise many of the most valuable common to tropical latitudes. Dense forests of teak and other heavy timber, useful for ship-building, cover a great part of the interior, especially toward the E. end of the island. The Javanese teak is inferior in hardness and solidity to that of Malabar, while superior in those respects to that of Burmah, and is said to excel every other variety in durability. The sago and many other palms, the very curious pitcher-plant (*Nepenthes distillatoria*), and two virulently poisonous plants, the *anchar* and the *chetik*, are indigenous. — The vast majority of the Javanese are a people of husbandmen. The wealth of a province or village is measured by the extent and fertility of its land, its facilities for rice irrigation, and the number of its buffaloes. Four fifths of the entire population are engaged in agriculture, and it is probable that if the whole island were under cultivation, no area of land of the same extent in any other quarter of the globe could surpass it, either in the quantity, quality, or value of its vegetable productions. At present only about one-third part of the surface is under culture; and yet *J.* not only produces enough of corn for its own consumption, but is the granary of the E. Archipelago, and even of Singapore. Within the last 20 years the cultivation of all its great staples has wonderfully increased. The husbandry of the Javanese may be said to exhibit, upon the whole, neatness and order. It is true, the implements of agriculture are few and simple; but, as well as the processes of husbandry, they are more perfect, and imply a greater degree of intelligence, than those of any Asiatic people, the Chinese excepted. Rice is a principal article of cultivation, and is the leading food of all classes; it is grown everywhere where water is to be had. Coffee, however, is the great commercial staple of the island, and is immediately followed by sugar, the growth of which has nearly kept pace during late years with the coffee-crop. Since 1839 the govt. spice monopoly has been done away with, and the cultivation of spices permitted without restriction. Indigo succeeds well, and bids fair to rival that of India. Tobacco, cotton, pepper, the cereals, a great variety of pulses and vegetable oils, the sweet potato, cocoa, betel, etc., are all extensively produced. The greater part of the soil of *J.* is claimed as govt. property, and it is only in the residencies in the N.W. part of the island that there are private estates, chiefly owned by Hollanders. The bulk of the natives are held in strict subjection as agricultural laborers. The landlords, whether govt. tenants or private land-owners, enforce one day's gratuitous work out of seven from all the laborers on their estates, and they are besides entitled to as much work as they choose to claim, on the sole condition of paying each man the wages ruling in the district. Great power is vested in the Resident, and his European and native officials, to enforce a strict adherence to all the laws regulating labor. The whole of the exports from *J.* to Holland, on account of the government, are carried by, and the property of, the *Nederlandsche Handel Maatschappj.* This trading corporation was established at Amsterdam in 1824, with a capital of 37,000 000 fl ($15,540,000), but which was subsequently reduced to 24,000,000 fl. ($10,000,000). Manuf. are few, and principally domestic, comprising coarse cotton fabrics, leather and saddlery, matting, bamboo-work, matchlocks, copper wares, etc.

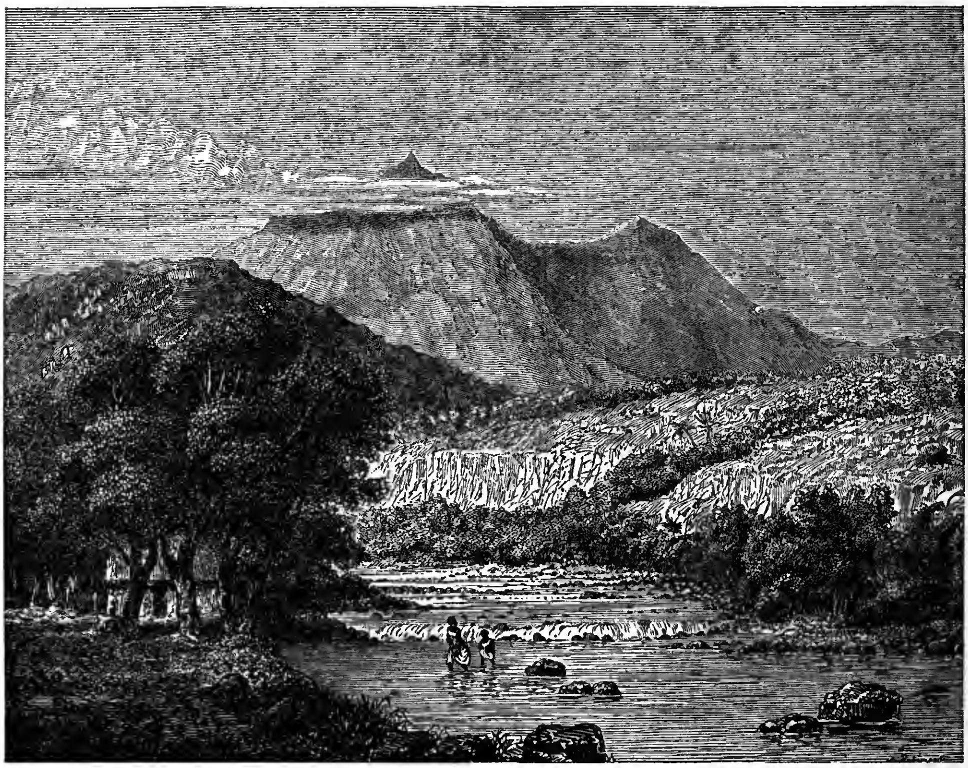

Fig. 296. — Source of Solo River (Java).

The greater part of the trade of *J.* is with Holland, and the commercial intercourse with other countries is comparatively small. On the average of the three years. 1875 to 1877, the total imports amounted in value to 84,120,000 guilders, or

$35,050,000, and the total exports to 120,240,000 guilders, or $51,000,000. About two thirds of the imports came from Holland, and not far from three fourths of the exports were shipped to the mother country. The principal foreign countries trading with *J.* are Great Britain, France, the U. States, and Germany. The principal articles of export from *J.* are sugar, coffee, rice, indigo, and tobacco. With the exception of rice, about one half of which is shipped for Borneo and China, nearly four fifths of these exports go to Holland.

The exports of *J.* and other Dutch East Indian islands to the U. States for the year 1878 amounted to $4,568,515, consisting chiefly of 14,573,766 lbs. coffee, valued at $2,799,562, and spices valued at $1,284,327. The imports from the U. States amounted to $1,456,362, in which mineral oil entered for $1,414,594.

Money, Weights, and Measures The only legal coins, as well as weights and measures, are those of Holland; but the *pecul* = 133 lbs., the *catty* = 1⅓ lbs., and *chang* = 4 yards, are commonly used in commercial transactions.

Seaports. The principal ports, and those to which foreign trade is confined, are Batavia, Samarany, and Sourabaya, on the N. coast, where, the sea being usually smooth and the weather moderate, good anchorage may be found at nearly all seasons. The S. coast, owing to its complete exposure to the Indian Ocean, has no good harbors, and is but little frequented. The best in this quarter are Chalachap and Pachitan. Produce, especially rice, is shipped from most of these ports; but almost the whole external commerce is concentrated at Batavia.

Batavia, a large city and seaport on the N. W. coast of *J.*, and the capital of all the Dutch settlements in the East, situated on both sides of the river Jacatra or Tjiliwroug, in a swampy plain at the head of a capacious bay, lat. 6° 10′ S., lon. 107° E. A circular range of islands shelters the roads and insures safe anchorage; but the water is shallow, and large vessels lie about 3 m. from shore. The old town was proverbially unhealthy, but the general character of the place has been considerably modified during this century. Canals have been filled up, streets have been altered, and all the European inhabitants, except those immediately connected with the shipping, have removed to the New Town, which has been gradually formed by the integration of Weltevreden and other suburban villages. The situation of this modern part is higher and healthier; and the grandeur and variety of its buildings far surpass anything to be found in the older section of the city. Batavia is still a great commercial depot, though it has had to contend with the rivalry of Singapore. The produce of the Eastern Islands is collected at its port for re-exportation to India, China, Europe, and America, — namely, gold-dust, diamonds, camphor, benzine, and other drugs; edible bird's-nests, rattans, beeswax, tortoise-shell, and dyeing woods from Borneo and Sumatra; tin from Banca; spices from the Moluccas; fine cloths from Celebes and Bali, and pepper from Sumatra. Almost the only manufactures of any importance are the distillation of arrack, the burning of lime and bricks, and the baking of pottery. The number of American ships that entered this port in 1878 was 16, with a tonnage of 11,447; the total number of vessels of all nationalities being 841, with a tonnage of 221,468. Pop. 100,000.

Jaws, the inner ends of the booms or gaffs of a ship hollowed in.

Jean, a twilled cotton made both striped and white. Satin jeans are woven like satin, with a smooth, glossy surface, and are used for stays, shoes, children's frocks, etc.

Jeers, tackles used in a ship, for hoisting the lower yards.

Jefferson Insurance Co., a fire-insurance Co. located in New York City, organized in 1824, reorganized under the general act and an amended charter in 1865. *Statement*, Jan. 1, 1879: Cap. stock paid up in cash, $200,010; net surplus, $314,003.26. Surplus constituting a permanent reserve fund represented by scrip which cannot be redeemed so as to diminish said reserve, $200,010; total cap. and surplus, $714,023.26. Risks in force, $11,984,032; premiums, $50,645.91. Premiums received since the organization of the Co., $3,834,890.94; losses paid, $1,710,259.21; cash dividends paid to stockholders, $1,466,881.21.

Jefferson Insurance Co., a fire and inland insurance Co., located in St. Louis, Mo., organized in 1865. *Statement*, Jan. 1, 1879: Cap. stock paid up in cash, $200,000; net surplus, $39,035.60. Risks in force, fire, $5,082,910; premiums, $54,571.04; inland risks, $5,000; premiums, $50. Premiums received since the organization of the Co., $567,827.59; losses paid, $247,268.76. Cash dividends paid to stockholders, $109,046.

Jeffersonville, Madison, and Indianapolis R.R. runs from Louisville, Ky., to Indianapolis, Ind., 111.50 m., with branches from Jeffersonville to New Albany, 6 m., from Columbus to Cambridge City, 18.2 m., from Columbus to Shelbyville, 26 m., and Cambridge extension R.R., 20.8 m. This Co., whose offices are in Louisville, Ky., was organized in 1866 by the consolidation of the Jeffersonville and the Indianapolis and Madison R.R. Cos. The road is leased to the Pennsylvania R.R. Co., which has operated it since 1873. Cap. stock, $2,000,000; funded debts, $4,792,000, consisting of Jeffersonville, Madison, and Indianapolis R.R. 1st mortgage bonds, issued 1866, $2,395,000, payable 1908, interest 7% (April and Oct.); 2d mortgage (same line) bonds, issued 1870, $2,000,000, payable 1910, interest 7% (Jan. and July); Indianapolis and Madison R.R. 1st mortgage bonds, issued 1862, $397,000, payable 1882, interest 7% (May and Nov.).

Jelly, a homogeneous mass. The principal animal jellies are gelatine, glue, and isinglass; the vegetable jellies are those in which the sirups of fruits are made into preserves.

Jelly-Mould, a confectioner's shape for making jelly in.

Jemmies, a woollen cloth made in Scotland, also called shafts. — Housebreakers' tools.

Jenny. See SPINNING-JENNY.

Jerked Beef, the lean parts of beef cut into strips or slices about one inch thick, and dried in the sun. It is sometimes salted before drying, and is often sold under the name of *charqui*. Jerked beef is largely prepared and consumed in South America.

Jerquing, in England, the search of a ship by a custom-house officer, called a jerquer, to ascertain if there are any unentered goods concealed.

Jersey, Guernsey, Alderney, Sark, small islands in the English Channel, off the French coast of Normandy, subject to Great Britain, having been originally part of the patrimony of the Norman kings. Area of the whole, 112 sq. m.; population, 90,596. These islands have local legislatures, their political constitution being separate from that of the United Kingdom.

Jersey, the largest and most important of these islands, is situated 13 m. W. of the coast of France. is 12 m. in length and about 7 in breadth. The surface is undulating and fertile, and chiefly laid out in pasturage and orchards. The Jersey merchants, besides carrying on an active intercourse with France, import largely wine and brandy from Spain and Portugal, and sugar and coffee from Brazil, which they exchange in the N. of Europe for corn, timber, hemp, and tallow. The chief port and town is St. Helier, from whence steamers communicate with Southampton and Weymouth.

Jersey, fine yarn of combed wool.

Jersey Cattle. See CATTLE (NEAT).

Jerusalem Artichoke. See ARTICHOKE.

Jerusalem Oak, Worm-Seed, the *Chenopodium botrys*, a fragrant plant, growing in the southern parts of the U. States. Its roots are used as an expectorant.

Jesse, a large branched candlestick.

Jet, Pitch-Coal [Fr. *jais;* Ger. *Gagat;* It. *gogata*], a species of soft bituminous coal, of a beautiful deep black color, with a brilliant resinous lustre, admitting of a fine polish. It is found in many parts of Europe, and occurs in massive plates, and sometimes in the shape of branches of trees, but without a regular woody texture. It is worked up into many kinds of mourning articles of ornament, such as brooches, bracelets, earrings, etc.

Imp. duty: Jet beads and bead ornaments, 50 per cent; manufactured jet, or imitations of jet, 35 per cent; unmanufactured jet, free.

Jetsam, or **Jettison**, is the throwing overboard any part of a vessel or her contents, for the safety of the remainder, by enabling her to weather a storm or get off a shallow. When such an act takes place, the several persons interested divide the loss among them. See AVERAGE.

Jetty, the projecting part of a wharf; a mole or timber pier to land goods and passengers on.

Jewel, a precious stone; a gem.

Jewel-Blocks, blocks at the yard-arms of a ship, for the studding halyards to pass through.

Jewel-Case, a lady's case for keeping gems and ornaments in.

Jewelling, a term particularly applied to the art of setting precious stones of a hard nature to different parts of a watch, so that the spindles or pivots of the wheels may work in them. This is a very delicate work, requiring tact and discrimination. A watch "jewelled in four holes" has four such pivot-gems, and so on.

Jewellers' Cement. See CEMENT (ARMENIAN).

Jewellers' Gold. See GOLD.

Jewellers' Rouge. See ROUGE.

Jewellers' Sweeps, a general name for the scraps, dust, and washings remaining in jewellers' workshops, gold-pen manufactories, etc., which are collected by persons who separate the gold and silver from the refuse.

Jewelry is a term applied to any ornaments made of precious stones set in gold or silver for the adornment of the person. In an extended sense it includes any small article made of gold or silver, even though no precious stones or jewels be used in its manufacture. Under the comprehensive term *jewelry* is also frequently included false or imitation *J.*

The work of preparing the stones, by cutting them into a suitable form and polishing them, belongs to the lapidary (see LAPIDARY-WORK). It is the peculiar province of the jeweller to make settings of metals for the stones, and secure them therein, and to manufacture trinkets of any kind in gold or silver, whether in combination with jewels or not. The settings of ornaments are made by casting the metal in small moulds or stamping it with dies, after which a finish is given by chasing, burnishing, and lacquering. Gems are fixed in their setting by cement and the aid of the blowpipe, a small hammer, and some very fine files. The value of gold is estimated by the ratio that exists between the gold and the alloy, the whole mass being considered to be divided into 24 equal parts. Thus, pure gold is spoken of as being "24 carats fine"; old standard or sterling gold as being 22 carats, and new standard gold 18 carats: which means that sterling gold contains 22 parts of gold to 2 of alloy, and new standard gold 18 parts of gold to 6 of alloy. Pure gold, or gold of 22 carats, is too soft for the purposes of the jeweller; and as articles of *J.* bear no mark to determine the quality of the gold, purchasers having no means of testing it may often be led by specious announcements to give a high price for a chain or ornament of no intrinsic value. Gold used in *J.* may be mixed with such a large proportion of alloy as to be comparatively worthless while it presents a fair appearance to the sight. The tint of the metal or composition may be made paler or deeper, according to the preponderance of silver or copper in the alloy; and the introduction of zinc has the effect of improving the appearance of the metal, and rendering its similitude to pure gold still greater; while the intrinsic value of the composition thus produced is very small. — At Providence an immense amount of cheap *J.* is made by reducing to the smallest possible thinness the layer of gold upon a body of cheaper metal; while every variety of glass, enamel, and crystal is made to imitate gems and precious stones. The best American *J.* is manufactured in New York. — For the year 1878 the value of our imports of *J.* and all manuf. of gold and silver was $249,253; and the value of exports, $208,142.

Imp. duty: Jewelry, 25 per cent; imitations of, or mock, jewelry, of brass or other metal, 25 per cent.

Jews-Harp, a metal instrument for music, played in the mouth.

Jews-Mallow, a name for the plant yielding the jute fibre. See JUTE.

Jhapees, peculiar umbrella-shaped hats, worn by the lower class of Assamese, made from the coarse leaves of the Tokopat and Talipot palms.

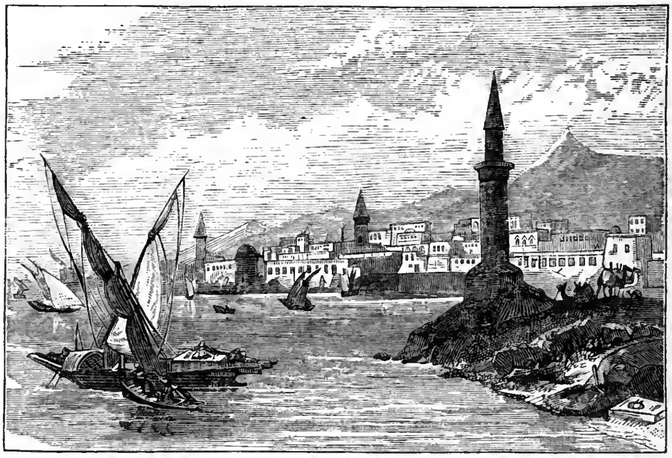

Fig. 297. — JIDDAH.

Jhuggery, a mixture of tobacco, molasses, and opium, which is smoked by some of the lower-class natives in the East.

Jib, the projecting frame of a crane. — A triangular ship's sail set on a stay, forward.

Jib-Boom, the spar rigged out beyond the bowsprit; the flying jib-boom is another added spar.

Jib-Door, a door made flush with the wall on both sides.

Jiddah, a seaport town of Arabia, on the Red Sea, about 21 m. from Mecca, of which it is the seaport, in lat. 21° 29′ N., lon. 39° 14′ E. It is well built; the streets are unpaved, but spacious and airy; the houses are high, and constructed, for the most part, of madrepores and other marine fossils. The supply of water is scanty, and its quality indifferent. Small vessels approach close to the quays; but large vessels are obliged to anchor in the roads, about 2 m. off, loading and unloading by means of lighters. The entrance to the roads is difficult, and should not be attempted without a pilot. *J.* is a place of considerable commercial importance. It is the entrepot in which is centred the greater part of the commerce between India, Egypt, and Arabia. The trade in coffee brought from Mocha and other ports in Yemen is the most considerable, but it is said also to be the most hazardous. The returns are principally made in cash. The trade with India and the Persian Gulf is safer than the coffee-trade, and is very considerable. *J.* has also a good deal of intercourse with the ports of Cosseir, Souakin, and Massouah, on the opposite coast of the Red Sea. The imports from the last two principally consist of slaves, gold, tobacco, dhourra, or barley, hides, butter (immense quantities of which are used in Arabia), mats, etc.;

in return for which the Africans receive Indian goods suitable for their markets, dresses and ornaments for their women, dates (which are not produced in any part of Nubia), iron, etc. The principal article of import from Cosseir is wheat; and not only *J.*, but the whole Hedjaz, or Holy Land of Arabia, is almost entirely dependent upon Egypt for corn. Coffee is the principal article sent in return. Business is transacted at *J.* with ease and expedition. The number of vessels belonging to the port is estimated at 250. Pop. 20,000.

Jig, a term applied in many trades to a variety of handy tools, and to small and simple machines.

Jigger, a potter's wheel, by which earthenware vessels are shaped, etc., by a rapid motion. — A small ship-tackle used about decks or aloft. — A machine to steady a cable. — A tool used by coopers for stripping the outside of staves. — A machine for graining morocco leather. — A miner who cleans ores in a wire sieve.

Jigging, in mining, the process of sorting ore, by passing it through a griddle, or wire-bottomed sieve.

Job, a piece of work; anything to be done; an undertaking with a view to profit. — The name applied, in printing business, to cards, shop-bills, reward-bills, play-bills, posting-bills, auctioneers' catalogues, price-lists, and other small things of a similar kind. Job-houses seldom execute book-printing to any great extent, as their materials are not calculated for it.

Jobber, a person who undertakes small pieces of work. — A wholesale merchant, who purchases goods from importers, and sells to country merchants and to retailers. In England, a jobber is an outside or wholesale dealer on the Stock Exchange, who makes the price at the market value for joint-stock or public securities between the buyer and seller; being the intermediate agent between the stock-broker and the public.

Job's-Tears, a popular name for the stony, bead-like seeds of a grass, the *Coix lachryma*, used for making necklaces, etc., and valued for medicinal qualities.

Joe, a Portuguese and Brazilian gold coin, worth about $8.70.

Joggles, pieces of hard stone introduced in a joint; particular kinds of connecting joints in masonry.

Johannes, a Portuguese gold coin, worth $8.

Johannisberger. See GERMANY (WINES OF).

Joinery, the art of connecting and fitting separate pieces of timber together, whether large or small, but which is more properly confined to the operations of the carpenter, who makes the doors, staircases, window-frames, and other internal fittings of a house, and who is, in consequence, called a joiner.

One of the most important joints in carpentry is the *scarf*, by which two thick pieces of timber are scarfed or fastened together, that they may present the appearance of being one continuous piece of the same width and thickness throughout. It is principally used in preparing the keels of vessels and beams in which great length is required. Masts are also sometimes joined together in this way. The form of the scarf is various. The most common method is that which is used in fastening small pieces of timber, or the joints of a fishing-rod, together, in which a plain bevelled joint of some length runs diagonally through the piece, and is formed by bringing together the extremities, which have been cut in such a manner that the bevelled surfaces of the ends of each piece form a very small angle with the external surface of the side that meets it at the sharpened end; but this would not be sufficiently strong for joining together pieces of timber of considerable size; so the ends are generally cut and fitted together in the form of steps, from which this kind of scarf has obtained the name of the *step-scarf*. The French have a method of cutting the ends of each piece into a sloping zigzag or notched form, which is perhaps better adapted to resist longitudinal tension; but all timbers joined by scarfing should be secured with bolts, having nuts and screws at either end; and it is better to put substantial plates of iron across the ends of the joints that appear in the upper and under surface of the beam through which the bolts are passed, so that each end of the scarf is bound and tied together by a framework of iron. Sometimes pieces of iron of some breadth are fitted to the sides of the beam, and fastened together by bolts passing above and below the beam; this plan is adopted when the timbers have to resist any transverse strain. If no bolts are used to strengthen the scarf, it must be much longer in proportion to the depth of the beam. With bolts, the length of the scarf should be at least twice the depth of the beam in elm, oak, beech, ash, and all kinds of timber of a similar nature to these materials: but in deal, it must be four times the depth. Without bolts, the length of the scarf, for all kinds of wood, must be three times as long as it would be if bolts were used, to add to the security of the joint. When joints are made in timber in which the grain in each piece runs in the same direction, and parallel to the sides of the wood, they are called *longitudinal joints;* but when the grain of one crosses that of the other at right angles, it is called an "abutting joint." A simple method of joining small pieces of timber at right angles to each other is by notching or cutting away half the thickness of the end as far into the length of the timber as may be required. This is done to each of the pieces that have to be fastened together. When two pieces cross each other at right angles, or indeed at any angle, a joint is made in this way, by cutting a piece out of each piece of wood to the extent of half its thickness, and corresponding in width or shape to that of the piece which is to fit into it. When broad pieces of timber or planks are joined at the ends, they are dovetailed into each other, or notched and dovetailed. The dovetail joint is sometimes used in joining square pieces of wood end to end, but it is not so strong as the scarfed joint for this purpose. Notched joints of any kind, such as those already described, and the notches made to allow the ends of rafters to fit into girders and wall-plates, or to fit against the inner edge of the latter, are always secured by nails or wooden pegs. The joint most commonly used for putting pieces of wood together to form strong rough frames, and for putting together partitions and large structures of timber, is the *mortise-and-tenon joint*. A square hole is sunk in one piece of timber by means of the mortise-chisel and mallet, and the end of the piece of timber that is to fit into it at right angles is cut to the shape of the hole by the tenon-saw. When the pieces have been fitted together, the joints are nailed or pegged, or the tenon is locked closely into the mortise by splitting its extremity and inserting one or more thin wedges. The above are the different descriptions of joints used in carpentry. Those adopted in joinery are similar in principle; thus the component parts of the framing of a door or shutter are put together by mortise-and-tenon joints; but the mortises and tenons are long and very narrow, instead of being square, or twice as long as they are broad, as in carpentry, when heavy timbers are fitted together. The dovetailed joint (see DOVETAILING) is used for joining the ends of planks that form the sides of drawers and boxes, while different varieties of the mitre joint are used for fitting and joining the corners of picture-frames and ornamental beading placed round a panel. In making staircases a broad groove is generally cut in the under side of the horizontal board called the head, at a short distance from the edge, or *nosing*, in front, into which the top of the vertical board, or riser, below it is fitted. This method of joining boards is called *notching*. Machine joinery, so to speak, has extended largely within late years. We allude to the establishment of large factories, in which steam-worked machines are employed in sawing, planing, dowelling, tenoning, grooving, and otherwise treating timbers for the making of doors, windows, and other articles of joinery. Such articles can be purchased in any quantity, and many builders now keep a stock of them in readiness instead of making them by hand as wanted. See WOOD-WORKING MACHINERY.

Joint, a junction of wood, etc. See JOINERY. — The place where two parts are united, or where pieces are articulated with each other, as in gas-pipes, etc.

Jointing-Plane, the largest plane used by carpenters and joiners.

Joint-Stock Company is a species of partnership to which all the laws affecting ordinary private companies apply, except in so far as they are incompatible with the nature of a public joint-stock company. This is the position of the law in general as to joint-stock companies, but in practice they are in almost every case materially distinct from private partnerships, by the special privileges respectively conceded to them. The lead-

ing distinction between joint-stock and private companies is this, that, while the latter trade under the name of partners or presumed partners, and in all their transactions present to the public certain individuals as the parties principally liable, the former trade under a descriptive name, on the credit of their stock, and without any individuals appearing as responsible for the engagements. The next peculiarity of a joint-stock company, and one that is essential to the existence of such a body, is, that the shares are transferable by assignment and delivery, as articles of commerce, without the consent of the partnership. By recent statutes in most of the U. States a qualified corporate character has been given to joint-stock companies. Though there is no uniformity in these statutes, they are very similar in their principal enactments; and, to avoid repetition, we refer to the heading CORPORATION, under which has been given in full the *General Act for Organizing Business Corporations in the State of New York.*

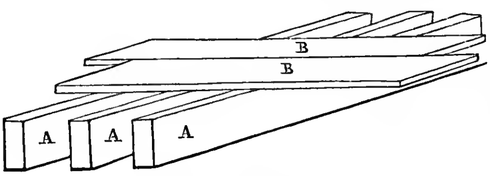

Fig. 298. — SINGLE FLOORING.

Joist, the horizontal timber on which the flooring of buildings is laid. Single flooring is that in which there is but one series of joists, as shown in Fig. 298, where A A A are joists, and B the flooring-boards. To make a single floor as strong as possible, the joists should be thin but deep, sufficient thickness being always allowed for the nailing of the flooring-boards. Two inches by six is the smallest dimension for joists; for a length of twenty feet

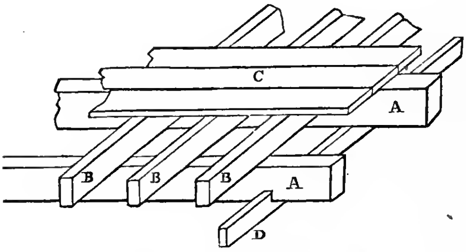

Fig. 299. — DOUBLE FLOORING.

they should be about three inches thick and twelve inches deep. Double flooring is that in which there are two tiers of joists, the *binding joists*, as A A, in Fig. 299, which in fact support the floor, and the *bridging joists*, B B. In this kind of flooring the binders extend from wall to wall, and the bridging joists are notched down upon them. Beneath the binders we have a third tier of timbers, D, which are pulley-mortised into the binders, and are called *ceiling joists*.

Jolly-Boat, a small boat, usually hoisted at a ship's stern, and sometimes termed a yawl.

Jolt, to jerk or shake.

Jornalero [Sp.], day-laborers.

Jorum, a full bowl.

Joseph [Fr.], thin, unsized paper; silver or blotting paper.

Jostick, aromatic or fumigating wood, used in China for incense-tapers, etc.

Journal, a ship's log-book. — A day-book; a diary or register of daily transactions in business (see BOOK-KEEPING). — A daily newspaper. — The bearing portion of the shaft in machinery; that which revolves on a support situated between the power and the resistance.

Journalist, a news-writer; an editor.

Journeyman, one who works for hire by the day; a mechanic employed to work for another in his particular trade.

Jow, a name in India for barley.

Jowl, JOLE, the cheek or head of a pig salted.

Judge, a measuring staff for estimating excavating work done in coal-mines. A civil officer appointed to try causes, or preside over a court of justice.

Judgment, a compulsory decree; the sentence pronounced in a cause by a judge.

Judiega, Spanish olives, not fit for eating, but used for making oil.

Judwar, an Arab name for the round zedoary (*Curcuma zerumbet*), which resembles ginger in flavor, though less pungent and agreeable.

Juephul, the name in Hindostan for nutmeg.

Juff, YOUFT, a Russian name for hide.

Jug, a pitcher, or water vessel.

Juggle, a block of timber cut to a length, either in the round or split.

Juice, the succulent or fluid part of meat; the water of fruit; the sap of vegetables.

Fig. 300. — JUJUBE.

Jujube, the fruit of the *Zizyphus vulgaris*, and *jujuba* (Fig. 300), which nearly resembles a small plum, and is sweet and mealy; the former are brought into this country from the South of Europe, in a half-dried state, and were formerly much used in pectoral decoctions. The bark and root are used medicinally in the East. The term *jujube* is, however, very generally applied by chemists and confectioners to a thickened mucilaginous lozenge made from the jujube fruit. The article commonly sold under the name consists only of gum-arabic and sugar.

Julep, a drink consisting of a solution of sugar in an aromatic water, with a seasoning of mint, etc.

Julienne, a kind of light, thin, vegetable soup.

Jumboo, a brass drinking-cup for wine, used in India.

Juniper, a genus of evergreen shrubs and trees, several species of which are useful both for their wood and their berries. The berries used for flavoring gin are obtained from the *Juniperus communis.* They are also used for imparting pungency to beer. When roasted and ground they afford a substitute for coffee. The *oil of J.* is an important ingredient in varnish for pictures, wood-work, etc. It is white or yellowish, light, very liquid, of hot and acrid *J.* taste, and very strong smell. It is prepared on a large scale in Holland, and often adulterated with turpentine. — The berries have also a diuretic property, and are used in medicine. About 200 tons of them are annually imported to this country. *Imp.* free.

Junk, old rope or cordage, used for making mats, gaskets, points, etc., on board ship, and, when unravelled, forming oakum. — A flat-bottom vessel, generally of about from 100 to 150 tons burden, employed by the Chinese. *J.* are built in the shape of a slipper, and carry three masts, and a short bowsprit placed on the starboard bow. The masts are supported by shrouds, and on the fore and main mast is a kind of bamboo lateen or lug-sail. — A familiar name for salt meat packed in barrels for use on shipboard.

Junk-Ring, a steam-tight packing round the piston of a steam-engine.

Junk-Bottle, a strong, dark-colored glass bottle used for porter, ale, etc.

Junk-Store, a store where are kept for sale pieces of old cable, cordage, etc.

Jupon [Fr.], an under petticoat.

Jurema-Bark, an astringent bark, said to be obtained from the *Acacia jurema*, a native of Brazil.

Juriballi-Bark, a Demerara product, supposed to belong to some cedretaceous plant; it is described as being a potent bitter and astringent, and superior to Peruvian bark in fevers of a typhoid and malignant nature.

Jury, a body of men sworn to decide upon facts according to the evidence produced before them; a grand jury consists of 24, a special or petty jury of 12.

Jussi, a delicate fibre produced in Manilla from some undescribed plant, and of which dresses, etc., are made.

Justicoat, a waistcoat with sleeves; a close coat.

Jute, the long, silky fibre of *Corchorus capsularis* and other annual species of the same genus, belonging to the order *Tiliaceæ*, natives of Asia. It has come recently very largely into use for woven goods, and is the object of an immense trade under the English rule. The *J.* plant comes chiefly from India, where it grows rapidly, and calls for very little care in cultivation. The Hindoos make their gunny-bags of *J.* cloth (see GUNNY). The *J.* manufacture, which was hardly known in Europe till about 1840, is now largely carried on both in England and in this country. As *J.* is cheap, spins well, and looks glossy when woven, it has come greatly into favor, some of the mills working up as much as 1,000 bales of it every week. The main use of it is for sacking and bagging; other uses are for sheetings, mattings, ducks, and carpeting, and in combination with the more expensive fibres of cotton, wool, flax, and cocoa-nut. *J.* does not stand exposure to the weather, and hence is not suited for the manufacture of cordage. For the year 1878 the imports of raw *J.* into the U. States amounted to 40,997 tons, valued at $2,438,198; and the imports of manufactured *J.* to about $2,500,000.

In the culture of *J.* a warm, humid climate is essential to success; but the physical characteristics of the soils in which the plant flourishes greatly vary. It thrives with an almost equal luxuriance upon highlands or alluvial bottoms. It will grow upon comparatively dry uplands or in flooded valleys; but it prefers a high, moist, sandy loam. Alluvial mould, in which there is a liberal admixture of sand, is favorable to its growth; but a very dry or a very sandy soil is not adapted to this tillage. The seed is sown broadcast, from 20 to 30 lbs. to the acre. The time of sowing varies with the conditions of soil and climate. In the N. E. provinces of Bengal, where nearly all of the *J.* of India is raised, the seed is sown in February, March, and April. In the vicinity of Calcutta the seed is often planted as late as July. Sometimes two crops are raised in a season, but this is too exhausting to the soil. After the *J.* has come up, it is carefully thinned and then left, without much further tillage, to ripen. It matures in 12 or 15 weeks. The plant sometimes grows to the height of 20 feet, but its average height is 10 or 12 feet, and the diameter of the butts varies from half an inch to an inch and a half. One variety which is extensively cultivated has a smooth white bark and wide-spreading branches. The *J.* is cut while the plant is in flower, because the fibre is then more glossy and less woody. The seed ripens one month after the flowerage, and the fibre has then become so woody as to lose much of its commercial value. After cutting, the *J.* is usually kept 2 or 3 days, till the leaves fall off, and then it is immersed in water. The period of immersion varies, according to the temperature and character of the water, from 3 or 4 days to a month. The methods of steeping practised by the natives are various. The fibre, prepared in clear, running water, is strong, white, and glossy; the process, however, lasts for several weeks. But when the *J.* is soaked in stagnant water, although the disintegration is usually effected within 10 days, the fibre is apt to be weaker and more discolored. But in either case the action of the water is to loosen the fibrous bark from the woody stalk. The natives test the *J.* from day to day, and when they find that the bark is ready for removal, they enter the water and withdraw the stems by a succession of jerks. Their reason for effecting this separation in the water is, that the soft and even pressure of the fluid prevents the rupture of the fibres. After its removal the inner bark is stripped of its rind, freed from all woody adhesions, thoroughly washed, and immediately dried. It then readily separates into minute fibres, and is ready for the market or for domestic spinning. — The statistics of the development of *J.* manufacture in India are impressive and suggestive. In 1862 India exported 10,000,000 lbs. of fibre and rope, and 300,000,000 yards of gunny-cloth. In 1863 Great Britain employed more than 30,000 spindles in spinning 80,000,000 lbs. of Indian *J.* Recently this staple has risen to the dignity of the fourth place in the exports of India; only cotton, opium, and rice exceed it in commercial importance. Some of the Indian factories are immense. There is an establishment at Barnagpoor, near Calcutta, which employs more than 4,500 workmen, and annually manufactures more than 30,000,000 lbs. of *J.* In 1876 the total exportation of Indian *J.* was 700,000,000 lbs., of which Great Britain received upward of 395,000,000 lbs. In the same year more than 900,000 acres were devoted to the cultivation of *J.* in India; and in the provinces in which *J.* is principally raised, out of a population of 15,725,000, more than 1,350,000 were wholly or partially engaged in this occupation. — Under the auspices of the Department of Agriculture, experiments in the culture of *J.* have been successfully tried in South Carolina, Florida, Georgia, Louisiana, and Texas, the yield being in several cases at the rate of 3,500 lbs. to the acre. These trials conclusively established the fact that, wherever in the Southern States there is a hot, damp climate, and a moist soil of sandy clay or alluvial mould, *J.* can be profitably raised. The plant matures in this country in about the same time that it does in India. The April plantings were cut in July, and the June plantings were cut in September. Some of the stalks reached the height of 15 feet, and in some instances the fibre was, according to the judgment of experts, superior in strength to that of India. The cheapness of the foreign article, however, — ranging from 4 to 5 cts. per lb., — closes the incentive to production in this country, as long as there is no adequate protection to it by the tariff.

American Jute. A name lately given to a fibrous plant of the mallow tribe, discovered as utilizable by M. Lefranc in Pennsylvania and New Jersey, and which furnishes an excellent fibre, far superior to the imported Indian variety. Rope, carpet, and paper have been made from it with decided success, and its manufacture will undoubtedly add before long a new branch to our national industry.

Jute Butts are the coarse ends of the *J.* fibre cut by Indian jute-farmers from the peeled bark retted in rivers. Without this separation the long, fine fibre would not be salable. Jute butts are imported at about half-price of the regular *J.*,

and used for paper-making. Being refractory to bleaching, it serves only to make manilla paper.

Manufacture. The following are the chief processes after the *J.* reaches the factory. — *Oiling.* The bales being opened, the *J.* is spread out on a table, sprinkled with oil and water, allowed to remain a day or two, and pressed between rollers; this renders the fibres soft and pliable. — *Breaking.* The *J.* is passed between toothed rollers, the teeth of which bring the fibres nearly parallel, and arrange them into a sort of ribbon or sliver, and then between two other rollers with finer teeth. The two machines are called the *breaker card* and the *finisher card.* — *Drawing.* The slivers received from the finisher card fall into cans, whence they are subjected to the action of the *drawing-frame.* This acts like the similarly named machine in the cotton manufacture, — drawing out, narrowing, and thinning the slivers. — *Roving.* In the *roving-machine* the sliver receives a slight twist, and is wound upon bobbins. — *Spinning.* This is done on the *throstle* plan, not the *mule* (see SPINNING). the throstles making 3,000 to 4,000 revolutions per minute. — *Weaving.* After winding the warp-yarn on large bobbins in the *winding-machine*, placing it on the loom-beam by the *beaming-machine*, and winding the weft-yarn on the pirns of the shuttles by the *pirning-machine*, the spun threads of *J.* are ready to be woven into cloth. Here it need only be said that the loom and the shuttle are larger and stronger for *J.* than for cotton, as the material is for the most part worked up into coarser fabrics. In *J.* the finest yarns bear the lowest numbers, whereas in cotton they bear the highest. For a *J.* factory comprising 16 double spinning-machines, of 2,000 spindles altogether, with 100 looms, fitted for weaving bagging and sacking, the whole of the plant costs about $100,000. Of this sum $80,000 are for the working machinery, and $20,000 for steam-power and mill-gearing.

Imp. duty: J. fibre, $15 per ton; butts or cuttings, free; seeds, 20 per cent; all manuf. of *J.* n. o. p. f., other than such as can be measured by the sq. yd., 30 per cent; yarns, 25 per cent. (See also BAGGING, CARPETING, PAPER, and WASTE.)

Juvia, a South American name for the Brazil nut.

Jyntee, a name in India for the *Æschynomene sesban*, which yields an excellent charcoal used for making gunpowder.

K

Kabbelow, codfish salted and hung for a few days.

Kafilah, an African caravan consisting of from 1,800 to 2,000 camels.

Kahroba, the Hindustani name for amber.

Kaimester [Ger.], a wharfinger.

Kalamkari, the Malay name for calico.

Kale, the generic name for colewort, a kitchen plant.

Kaleidoscope, a highly ingenious optical instrument, showing by the change of position of small pieces of colored glass a great variety of beautiful designs, which have been found very useful to pattern-drawers.

Kalmuck, a kind of shaggy cloth or bear-skin; a coarse cotton fabric made of various colors in Prussia.

Kamisol [Ger.], a waistcoat or jacket.

Kamptulicon. See FLOOR-COVERING.

Kanastere, a rush basket.

Kangaroo, a marsupial animal peculiar to Australia, which is hunted for its flesh and its skin. The tail makes excellent soup, and the skin, when tanned, forms a soft and durable shoe-leather.

Kanna, a dry and liquid measure in Sweden, 4.6 pints; 100 being equal to 57.60 gallons.

Kansas, a very prosperous and thriving western central State of the American Union, bounded N. by Nebraska, E. by Missouri, S. by Indian Territory, and W. by Colorado. It lies between lat. 37° and 40° N., lon. 94° 40′ and 102° W., in a general rectangular form, extending 410 m. E. and W., and 210 m. N. and S. Area, 81,318 sq. m., or 52,043,520 acres. It is divided into 104 counties. *Topeka,* its capital, is situated on both banks of the Kansas river, here spanned by a fine iron bridge, 300 m. W. of St. Louis. It is remarkably well built, and has a large and rapidly increasing trade. Pop. 10,000. The other cities of *K.* are: Atchison, pop. 9,000; Banter Springs, 2,000; Emporia, 3,000; Fort Scott, 6,000; Lawrence, 12,000; Leavenworth, 25,000; Ottawa, 5,000; Paola, 2,500; and Wyandotte, 4,000. Besides these, there are over 300 populous and thriving towns. Population of the State, about 1,000,000.

The surface of *K.* is mostly level prairie, gently undulating towards the W., and without either any remarkable elevations or depressions. The prairies of the E. half are finely interspersed with timber (especially along the margins of streams, the principal trees being cottonwood, sycamore, oak, ash, hickory, walnut, sugar-maple, hackberry, sumach, and willow), which, though adequate to the home demand, is not sufficiently abundant to form the basis of an export lumber-trade. The most important rivers are the Kansas, Arkansas, Neosho, and Red Fork of Arkansas, besides the Missouri, which washes the N. E. border of the State. The Kansas River is formed by the Republican, Solomon's, Grand Saline, and Smoky Hill Forks. The latter enters *K.* near the middle of the W. border, and continues an almost direct E. course through the centre of the State, receiving the other forks from the N., and expanding into what is known as the Kansas River at Fort Riley, about 120 m. above where it enters the Missouri River. The Arkansas River also enters the State across the W. border, near Fort Aubrey, and after a general E. and S.E. course of about 350 m., makes its exit from Cowley Co., on the S. border. The Neosho River rises in Morris Co., in the E. central part of the State, and flowing S. E., passes out through Neosho Co., and, finally, the Red Fork of the Arkansas River, entering at the S. W. corner, penetrates but a short distance inland, and returning forms the S. boundary as far as Comanche Co. These important streams, with their numerous tributaries, intersect every portion of the State, irrigating the land, and affording communication to all points. — Immense beds of iron ore are reported to have been discovered 3 m. W. of Pond Creek in the W. part of the State. Iron beds also exist in central *K.*, but, owing to the mixture of the iron with sand, most of it is useless for manufacturing purposes. Kaolin has recently been discovered within two miles of Sheridan, a town on the line of the Pacific Railroad, in the W. part of the State. Lignite is being mined on the Smoky Hill Fork and its tributaries, and is extensively used by the railroad company as fuel. In the E. counties, coal of a superior quality exists in large quantities, and is now mined to a considerable extent, while in some places the upper stratum crops out above the surface. W. of the outcropping coal-strata is an irregular belt, from 50 to 75 feet wide, of Permian rocks, in which are found salt-springs and inexhaustible beds of gypsum. Marble has been discovered at a depth of 300 feet; the stratum is 12 feet thick, and the stone is the Pearl Spa marble, less destructible than the Italian. Platinum has also been found. — Lying on the W. slope of the Missouri Valley, *K.* occupies an important position in the grand territorial division known as the *Region of Cereals.* The extreme W. portion forms a part of a sterile belt, running S. W. from lat 47° N. to New Mexico, but the soil of the E part is excellent, and for the production of the heavier kinds of cereals this land is unsurpassed in richness by any of the neighboring States. For wheat and other small grains, the second-class lands, embracing the upland or rolling prairies, are preferred. These are covered with a soil averaging from 2 to 3 feet in depth, with a subsoil of fertilizing qualities sufficient to furnish inexhaustible production if skilfully managed. The fruit crop is abundant, particularly in the more common varieties which enter so extensively into domestic economy, as apples, pears, and grapes. Large vineyards exist in many of the E. central counties, where much attention is given to the manufacture of wine. The following table shows the acreage and the principal crops of *K.* for the years 1877 and 1878: —

Fig. 301. — SEAL OF KANSAS.

Crops.	Acreage, 1877.	Acreage, 1878.
Winter wheat	857,125.00	1,297,555.00
Rye	199,971.00	127,842.00
Spring wheat	206,868.00	433,257.00
Corn	2,563,112 00	2,405,482.00
Barley	79,704.00	56,255.00
Oats	310,226.00	444,191.00
Buckwheat	4,112.37	4,582.66
Irish potatoes	45,018.00	51,239.00
Sweet potatoes	1,726.23	2,266.93
Sorghum	20,783.75	20,291.88
Castor-beans	50,845 25	30,928.75
Cotton	507.62	509.30
Flax	27,735.37	37,001.70
Hemp	1,801.70	529.79
Tobacco	717.35	553 15
Broom-corn	21,147.14	20,220.17
Millet and Hungarian	164,529.00	144,081.00
Timothy meadow	25,212.50	40,121.12
Clover meadow	9,796.66	12,429.42
Prairie meadow	503,612.00	667,503.00
Timothy pasture	4,202.25	8,820.00
Clover pasture	1.445.49	3,770.25
Blue-grass pasture	21,299.31	27,876.73
Prairie pasture	553,717.00	701,421.00
Total	5,595,304.99	6,583,727.85

In 1879 *K.* had 11 national banks in operation, whose paid-in capital was $800,000. There were, besides, 109 State banks, savings-banks, and private bankers, whose aggregate capital was $1,472,344 The total debt of the State was $1,181.975, of which $607,925 was held by the permanent school fund. The total value of taxable property was $138,698,801.

K. is essentially an agricultural, stock-raising, and fruit-growing State. Its manufacturing interests, however, are rapidly increasing, while the general trade of the State is ad-

vancing with equal rapidity. The internal navigation is not so extensive as that of some of the neighboring States; hence railroad enterprise is stimulated by the necessities of trade. In 1879 *K.* had 2,427 m. of railroad, the assessed value of which was $15,523,033. They were prohibited to charge over 6 cents per mile for the transportation of passengers. The following table shows the names of the companies, the total length of roads, and the total length in *K.*: —

Companies.	Total length of line.	Total length of line in Kansas.
	Miles.	Miles.
Atchison and Nebraska	148.89	38.26
Atch., Rep. Valley, and Pacific	15.00	15.00
Atch., Solomon Valley, and Denver	29.25	29.25
Atchison, Topeeka, and Santa Fé	470.38	470.38
Florence, El Dorado, and Walnut Valley	29.32	29.32
Fort Leavenworth	2.50	2.50
Fort Scott, South-eastern, and Memphis	13.60	13.60
Iowa Southern and Mo. Northern	347.43	2.17
Joplin	35.85	17.93
Junction City and Fort Kearney	55.00	55.00
Kansas Central	84.00	84.00
Kansas City, Burlington, and Santa Fé	42.50	42.50
Kansas City, Fort Scott, and Gulf	159.92	157.70
Kansas City, Lawrence, and Southern	145.96	145.96
Kansas City and Santa Fé	31.91	31.91
Kansas City, Topeka, and Western	66.32	66.32
Kansas Pacific	672.60	478.78
Lawrence and South-western	31.00	31.00
Leavenworth, Atchison, and North-western	21.50	21.50
Missouri, Kansas, and Texas	785.80	255.09
Missouri River	25.25	25.25
Missouri and Western	84.00	28.40
Pleasant Hill and De Soto	44.89	23.06
Republican Valley	41.60	41.60
St. Joseph and Denver City	227.00	141.00
Solomon	23.00	23.00
Southern Kansas	9.70	9.70
Union Pacific, Central Branch	100.00	100.00
Waterville and Washington	20.00	20.00
Wichita and South-western	27.28	27.28

Kansas Central R.R. runs from Leavenworth to Onaga, Kan., 84 m. This road, which has its offices in Leavenworth, was chartered in 1871 and opened in 1877. Early in 1879 it was sold under foreclosure of 1st mortgage for $252,000, and immediately reorganized. It is proposed to extend it to Denver, which will give the line a length of 500 m. Cap. stock, $504,000; funded debt, $504,000, consisting of 1st mortgage sinking-fund 7% 30-year bonds, issued 1879, payable 1909.

Kansas City and Santa Fé R.R. runs from Olathe, Kan., to Ottawa, Kan., 31.91 m. This Co., whose offices are in Kansas City, Mo., opened the road in 1872, which was sold early in 1879 in foreclosure, and purchased for account of bondholders. It is leased in perpetuity to the Kansas City, Lawrence, and Southern R.R. Co., the latter paying as rental interest on bonds and dividends same as those paid on lessees' bonds and stock. Cap. stock, $720,000; funded debt, $720,000, consisting of 1st mortgage 10% 30-year bonds, issued 1871.

Kansas City, Burlington, and Santa Fé R.R. runs from Ottawa Junction to Burlington, Kan., 42.50 m. This Co., whose offices are in Burlington, Kan., was chartered in 1870, and the road opened in 1878. From Ottawa to the junction the Co. rents the line of the Kansas City, Lawrence, and Southern R.R. Cap. stock, $600,000; funded debt, 1st mortgage 8% bonds, $600,000.

Kansas City, Lawrence, and Southern R.R. runs from Lawrence to Coffeeville, Kan., 144.16 m. The following lines are operated on lease: Kansas City and Santa Fé R.R., from Olathe to Ottawa, 31.91 m.; the Southern Kansas R.R., from Cherry Vale to Independence, 9.70 m.; the Kansas City, Fort Scott, and Gulf R.R., from Olathe to Kansas City, 21 m. This Co., whose offices are in Kansas City, Mo., was originally organized as the Leavenworth, Lawrence, and Galveston R.R. The road was opened in 1870, and was sold in 1878 for $760,000, and purchased for account of bondholders. Cap. stock and funded debt at the time of sale amounted to $10,000,000.

Kansas City, St. Joseph, and Council Bluffs R.R. runs from Kansas City, Mo., to Council Bluffs, Ia., 198.8 m.; branches, 55.03 m.; total, 253.83 m. This Co., whose offices are in St. Joseph, Mo., was formed in 1870 by the consolidation of the St. Joseph and Council Bluffs R.R. and the Missouri Valley R.R. Cap. stock, $2,789,413.66; funded debt, $7,485,196.64. Funded debt in detail: 1st mortgage (Council Bluffs and St. Joseph), issued 1866, $500,000, payable 1880, interest 7% (Jan. and July); 1st mortgage, consols issued 1877, $4,495,522, payable 1907, interest 7% (Jan. and July); income mortgage, consols issued 1877, $2,488,174, payable 1907, interest 6% (April and Oct.).

Kansas City, Topeka, and Western R.R. runs from Kansas City, Mo., to Topeka, Kan., 66.32 m. This Co., whose offices are in Topeka, formed originally part of the St. Louis, Lawrence, and Western R.R. In 1875 it was leased to the Atchison, Topeka, and Santa Fé R.R. Co., at a rental of 34% of the gross earnings, and is now used as the main line of the lessees from Kansas City to Topeka. Cap. stock, $2,250,000; funded debt, $1,054,000, consisting of 1st mortgage 20-year bonds, issued 1875, $854,000, interest 7%; and income 30-year bonds issued 1878, $200,000, interest 7%.

Kansas Pacific R.R. runs from Kansas City, Mo., to Denver, Col., 638 m., with branch from Lawrence to Leavenworth, Kan., 34 m.; total length, 672 m. This Co., whose offices are in Kansas City, was first organized in 1861 as the Leavenworth, Pawnee, and Western R.R., which name was changed to that of Union Pacific Railway, Eastern Division, in 1863, and to the present name in 1869. It received by the Pacific R.R. Acts of 1862 and 1863 a subsidy of $16,000 per mile, and a land-grant of 6,000,000 acres now held in trust for the benefit of bondholders. The Co. was reorganized in 1879, after having been in the hands of receivers since 1873, in consequence of having made default on interest of its funded debt. Capital stock, $9,689,950; funded debt, consolidated and mortgaged on the reorganization of the Co., $30,000,000, the bonds bearing date May 1, 1879, and payable May 1, 1918, interest 6%, payable May 1 and November 1.

Kaolin, a porcelain earth derived from the decomposition of the feldspathic granites, and much used for fine pottery. See Clay.

Kapak, the Malay name for a hatchet or axe.

Kapas, a name in the East for cotton in the seed, and for the herbaceous cotton-plant.

Kapitia, a resin or lacquer obtained in Ceylon from the sap of the *Croton lacciferum.*

Kapok, a name in the Eastern Archipelago for the cotton-down enveloping the seeds of the silk cotton-tree (*Bombax pentandrum*). It is used by the poor inhabitants for stuffing chairs, pillows, etc., but is seldom or never used for beds, it being thought unwholesome to sleep upon.

Kaross, a skin-cloak very neatly made by the Kafirs, and much esteemed for driving-wrappers, railway and carriage rugs, etc.; they are made of the wild-cat, silver and red jackal, mixed jackal, antelope, and weasel.

Kas, a horse-hair sieve. — A negro drum.

Kassa, a kind of fine catechu in cakes, made in India from the nuts or seeds of the *Areca catechu.*

Katchung-Oil, an Eastern name for ground-nut-oil, expressed from the seeds of *Arachis hypogæa.*

Katumbar, the Malay name for coriander.

Kauf [Ger.], a purchase or bargain.

Kaufmann, a merchant or tradesman in Germany.

Kaurie Gum. See DAMMAR.

Kavel-Mell, a large sledge-hammer used in Scotland for breaking stones.

Kayu-Manis, the Malay name for cinnamon.

Keaves, Cuves, chemical vessels employed to contain salts.

Kebbuck, a common name for cheese in Scotland.

Keckling, a sailor's name for old rope wound round cables to keep them from chafing.

Keckling-Pins, a name in Scotland for wires or needles used in knitting stockings.

Kedge, a small anchor with an iron stock, used for warping, or for riding in a harbor or river.

Keel, the principal piece of timber in a ship, which is usually first laid on the blocks in building. The *K.* supports and unites the whole fabric, since the stem and stern posts, which are elevated on its ends, are, in some measure, a continuation of the *K.*, and serve to connect and enclose the extremities of the sides by transoms, as the *K.* forms and unites the bottom by timbers. The *K.* is generally composed of several thick pieces placed lengthways, which, after being scarfed together, are bolted and clinched upon the upper side. The *false K.* is a strong, thick piece of timber, bolted to the bottom of the *K.*, which is very useful in preserving its lower side. The false *K.* is provided when the thick pieces which form the *K.* cannot be procured large enough to give a sufficient depth thereto.

Keelage, a duty, or toll, for the bottoms of ships resting in harbor.

Keel-Boat, a large, covered boat used on American rivers.

Keelfat, a vessel in which liquor is set to cool.

Keelson, a piece of timber forming the interior or counterpart of the keel, being laid upon the middle of the fore-timbers immediately over the keel, and serving to bind and unite the former to the latter, by means of long bolts driven from without and clinched on the upper side of the *K.* The *K.*, like the keel, is composed of several pieces scarfed together; and, in order to fit with more security upon the floor-timbers and crotchets, it is notched about an inch and a half deep opposite to each of those pieces, thereby scored down upon them to that depth, where it is secured upon them by spike-nails. The pieces of which it is formed are of only half the breadth and thickness of those of the keel.

Keen, sharp; having a fine edge.

Keeper, a preserver, a defender. — A ring, strap, pocket, etc., used to detain an object.

Keepsake, a remembrance or gift-token.

Keep up, to maintain one's credit; to sustain prices.

Keeve, a large vat used in the mining districts for collecting the fine grains of copper. — A mash-tub or vessel employed in brewing. — To tilt a cart, to unload it.

Keg, a wooden vessel or barrel for liquids, containing 3, 5, or 10 gallons.

Kehling [Ger.], fresh codfish.

Kehul, powdered antimony and resin, with which the Arab women darken their eyelids and eyebrows.

Keir. See BLEACHING.

Kellach, a kind of sledge or wicker cart used in Scotland.

Kelp, the ashes of burnt sea-weed, from which are obtained the common carbonate of soda and the valuable drug called iodine. *K.* is also used in the manufacture of glass and in the formation of soap. The small price at which salt can be obtained, however, has caused soda-makers to employ it instead of *K.*

Kelt, a name in Scotland for cloth with the nap, generally made with native black wool. — A spawning salmon.

Kelter, a wine-press in Germany.

Kemelin, a brewer's vessel.

Kemester, the name in Scotland for a wool-comber.

Kemp, Kempty, the coarse rough hair of wool, which is avoided by the manufacturer in his purchases of wool, deteriorating, as it does, the appearance of even common fabrics by its inferiority and harshness, and not taking dye readily. The *K.* of Cashmere goats' wool is now, however, made into coarse cloth.

Kemper, a popular name in Scotland for a competitor among reapers; one who strives to outrun the others in the quantity of work done.

Kennel-Raker, a rag-gatherer; a bone-grubber.

Kennets, a coarse cloth made in Wales.

Kent, a long shepherd's staff or leaping-pole.

Kentledge, a name sometimes given to the iron pigs cast in a particular form for ballasting ships.

Kentucky, one of the Central U. States, is situated between lat. 36° 30′ and 39° 10′ N., lon. 82° and 89° 40′ W. It is bounded N. W. and N. by the Ohio River, which separates it from Illinois, Indiana, and Ohio; E. by West Virginia and Virginia, from which it is separated by the Big Sandy River and the Cumberland Mountains; S. by Tennessee; and W. by the Mississippi, which separates it from Missouri. Its greatest length from E. to W. is 350 m., and its greatest breadth 178 m.; area, 37,680 sq. m. It is divided into 116 counties. *Frankfort*, its capital, is situated on both banks of the Kentucky River, and on the Louisville, Cincinnati, and Lexington Railroad, 45 m. E. of Louisville; pop. 6,000. The other principal cities of *K.* are Louisville (which see below); Covington, pop. 27,000; Henderson, 5,000; Hopkinsville, 4,000; Lexington, 18,000; Maysville, 5,500; Newport, 17,000; Owensboro', 4,000; Paris, 3,500; and Paducah, 8,000. Population of the State, about 1,500,000.

Surface, soil, etc. A tract from 5 to 20 m. wide along the Ohio River, through the whole length of the State, is hilly and broken, but has a fertile soil. The margin of the Ohio for about a mile in width consists of bottom-lands, which are overflowed when the river is high. Between this tract of hilly country and the more mountainous E. counties and Green River is a fertile tract, frequently denominated the garden of the State. It is about 150 m. long, and from 50 to 100 wide. The soil is excellent, the surface gently undulating, and the forest growth, black-walnut, black-cherry, buckeye, pawpaw, sugar-maple, mulberry, elm, ash, cottonwood, white thorn, and an abundance of grape-vines. The principal fruit trees are the apple and peach. The country in the S. W. part of the State, between Green and Cumberland Rivers, is called the "barrens." In 1800 the legislature of the State made a gratuitous grant of this tract to actual settlers, under the impression that it was of little value, but it proved to be excellent grain-land, and also adapted to the raising of cattle and swine. The whole State below the mountains has, at the usual depth of eight feet, a bed of limestone which has frequent apertures through which the waters of the rivers sink into the earth, causing some of them to disappear for a time, and others to be greatly diminished in the summer season. The Ohio River, by its various windings, borders this State on the north for 637 m. Cumberland and Tennessee Rivers pass through its

W. part as they approach their entrance into the Ohio. Cumberland rises in the E. part of this State. The Big Sandy is 250 m. long, and for a considerable distance forms the boundary between *K.* and Virginia. It is navigable 50 m. for boats. The Kentucky River rises in the Cumberland Mountains, and after a course generally through a deep rocky bed falls into the Ohio 77 m. above Louisville. It is navigable for steamboats 60 m. to Frankfort. Licking, Green, and Salt are other considerable rivers. The Mississippi runs on the W. border. The rivers have generally worn deep channels in the calcareous rocks over which they flow. The precipices formed by the Kentucky are in many places stupendous, presenting perpendicular banks of solid limestone 300 feet high, above which is a deep and difficult ascent several times as high. In the S. W. part of the State, between Green and Cumberland Rivers, are several remarkable caves. One called the Mammoth Cave, 130 m. from Lexington, on the road to Nashville, has been explored for a distance of eight or ten miles. The completion of the Louisville and Portland Canal around the falls of the Ohio at Louisville enables boats 300 ft. long and 80 ft. wide to pass through nearly the whole year. Iron ore and coal are widely diffused; coal especially occupies an extensive field. Salt springs are numerous, and mineral springs are found in many localities.

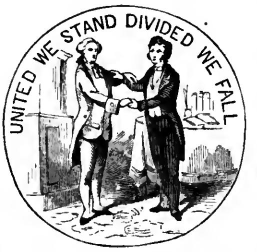

Fig. 302. — SEAL OF KENTUCKY.

The number of farms under cultivation in *K.*, as reported by the last census, was 118,422, the average size of which was 158 acres. The total amount of land in farms was 18,660,106 acres, of which 8,103,850 were improved and 10,556,256 unimproved. The cash value of farms was $311,238,916; farming implements and machinery, $8,572,896; total (estimated) value of all farm productions, $87,477,374; of orchard products, $1,231,385; of produce of market gardens, $527,329; of forest products, $574,994; of home manufactures, $1,683,972; of all animals sold for slaughter, $24,121,861; of all live-stock, $66,287,343. Of the total production of hemp in the U. States in the year of the census (12,746 tons), 7,777 tons were contributed by *K.*; and of the entire yield of tobacco (262,735,341 lbs.), 105,305,869 lbs. were the product of this State. The relative value of agricultural products for the year 1878 is given in this work under the name of each of the principal crops. — The total number of manufacturing establishments reported by the census was 5,390, using 1,147 steam engines of 31,938 horse-power, and 459 water-wheels of 7,640 horse-power, and employing 30,636 hands. The total amount of capital employed was $29,277,809; wages paid during the year, $9,444,524; materials consumed, $29,497,535; products, $54,625,809. In distilled liquors, the State (which manufactures almost exclusively whiskey) ranked first in the number of establishments, second in the amount of capital invested, and fourth in the value of products (see WHISKEY). *K.* has little direct foreign commerce, but its domestic commerce is very extensive, the principal articles of export being hemp, flax, tobacco, horses, mules, hogs, cattle, bagging, and rope.

In 1879 *K.* had 48 national banks in operation, whose paid-in capital was $9,936,500. There were, besides, 91 State banks, savings-banks, and private bankers, whose aggregate capital was $12,298,309. The total value of taxable property was $357,-326,013. The new rate of State taxation, which took effect in 1877, is 40 cents on the hundred dollars' worth of property, of which 15 cents only are revenue proper, the remaining 25 cents being set apart as school money.

Louisville, the largest city and the commercial emporium of *K.*, and port of entry of the State, is beautifully located at the falls of the Ohio, about 130 m. below Cincinnati, and 45 m. W. of Frankfort, in lat. 38° 3′ N., lon. 85° 30′ W. The streets are generally spacious, well-paved, straight, and cross each other at right angles. The city is well lighted and abundantly supplied with water. Dupont's Artesian well is one of the deepest in the world, being 2,086 ft. in depth, with a diameter of 3 inches. It supplies 330,000 gallons of water in 24 hours, to an elevation of 170 ft. above the surface. An immense bridge, 1 m. in length, completed in 1870, has been constructed over the Ohio River and Portland Canal. It consists of 19 spans, averaging 240 ft. each, and 2 great ones of 400 ft. each. The industry of Louisville is devoted to commerce rather than manufactures, although the latter are quite extensive. By means of the Ohio River it has uninterrupted intercourse, during the greater part of the year, with all the important cities and towns of the W. and S., and is connected by railroads directly with all points north, south, east, and west. Louisville is a port of delivery, belonging to the collection district of New Orleans. In 1879 there were belonging to the port 47 steamboats of 11,616 tons, and 44 barges of 3,394 tons; and there were built during the year 1878, 25 steamboats of 6,471 tons, and 17 barges of 2,388 tons. The chief articles of shipment are dry-goods, groceries, tobacco, provisions, leather, and whiskey. The sugar-curing of hams is extensively carried on in Louisville, and about 1,000,000 were cured in 1878 by 20 establishments. Pork-packing is also an important branch of the business of the city (see HOG). The leaf-tobacco market is one of the largest in the world, large quantities being annually bought here for the account of the French government, and also shipped to England, Germany, and Canada. Chewing and smoking tobacco, and cigars, are largely manufactured. Louisville is the great distributing market for the fine whiskeys made by the Kentucky distilleries. Other leading manufactures are those of beer, heavy sole and belting leather, lighter leather for skirting, harness, and upper leather, ploughs, furniture, and Louisville cement or water-lime, from the water limestone discovered during the excavation of the canal. In 1879 Louisville had 8 National banks, with an aggregate capital of $3,095,500; and 17 State banks, savings-banks, and private bankers, whose aggregate capital was $5,288,216. Pop. about 125,000.

In 1879 the State had 1,528 m. of railroad. The following table shows the names of the companies, the total length of roads, and their total length in *K.*: —

Companies.	Total length of line.	Total length of line in Kentucky
	Miles.	Miles.
Barren County	10.50	10.50
Chicago, St. Louis, and New Orleans	571.66	42.00
Cincinnati Southern	158.30	158.30
Covington, Flemingsburg, and P. Gap	17.25	17.25
Cumberland and Ohio	5.00	5 00
Eastern Kentucky	34.00	34.00
Elizabethtown, Lex., and Big Sandy	33.70	33 70
Kentucky Central	148.50	148.50
Lexington and Big Sandy	14.00	14.00
Louisville, Cincinnati, and Lexington	174.70	174.70
Louisville, Harrodsburg, and Westport	11.00	11.00
Louisville and Nashville	650.64	392.94
Louisville Railroad Bridge	1.20	1.20
Louisville Railway Transfer	4.13	4.13
Memphis, Paducah, and Northern	115.00	50.00
Mobile and Ohio	528.60	20.30
Mount Sterling	20.00	20.00
Nashville, Chattanooga, and St. Louis	348.50	7.50
Newport and Cincinnati Bridge	1.10	1.10
Ohio and Kentucky Coal and Iron Co.	30.00	30.00
Owensboro' and Nashville	35 00	35.00
Paducah and Elizabethtown	185.60	185.60
Pine Hill	3.00	3.00
St. Louis, Iron Mountain, and Southern	2.00	2.00
St. Louis and South-eastern	98.00	98.00
Shelby	18.60	18.60
South-western	10.00	10.00

Kentucky Central R. R. runs from Covington to Lexington, Ky., 99 m.; and from Paris to Maysville, Ky., 49.50 m. This Co., whose offices are in Covington, Ky., was chartered in 1875, and was formed out of the Covington and Lexington, and the Maysville and Lexington R. R. Cap. stock, $5,000,000; funded debt, $1,045,000.

Keroa-Oil, Ketgee-Oil, an essential oil obtained in the East from *Pandanus odoratissimus.*

Keron, a Persian silver coin worth about 25 cents.

Kerf, a notch or slit made in wood by cutting.

Keriek, a Turkish gold coin = 81 cents.

Kermes, or *Coccus ilicis,* an insect found in large quantities on a small species of oak in many parts of Asia and the South of Europe, particularly Spain. It contains a red coloring principle; and, until the discovery of the cochineal insect, was the only substance used in dyeing scarlet from the period when the shell-fish producing the Tyrian purple of the Romans ceased to be employed. It is still used in the Levant for dyeing the scarlet caps so much worn in those countries. In Europe and America it is entirely superseded by cochineal. — The same term is likewise applied to a factitious sulphuret of antimony, commonly met with in the form of a brown-red powder.

Kerned Letters, those letters of printing-type which hang over the shank.

Kernel, the edible substance contained in the shell of a nut.

Kerosene. See PETROLEUM.

Kersey (probably a corruption of Jersey, whence it originally came), a kind of coarse cloth, usually ribbed, and woven from long wool. *Kerseymere*, on the other hand, is a thin stuff, generally woven plain from the finest wools; and hence it has been inferred that these two terms, whose meaning is so distinct, cannot be referred to the same origin. Kerseymere is said to have derived its appellation from Cashmir, a country which produces the finest wool, and is consequently most celebrated for the works of its looms.

Keslop, a name for rennet, the substance used in curding milk.

Kessel-Beer, home-brewed beer in Germany.

Ketch, an almost obsolete form of two-masted vessel with the main-mast placed amidships, and a mizzen-mast, ranging from 100 to 250 tons. It was nearly synonymous with the modern term *yacht.*

Ketchup. See CATCHUP.

Kettle, a metal boiler, saucepan, stewpan, or other cooking vessel for heating and boiling water for domestic purposes.

Kettle-Drum, a musical instrument used in military bands, consisting of two basins of copper or brass with goat-skin or vellum stretched over them.

Kevel, a strong piece of wood bolted to a stanchion for belaying ropes to; a frame for spreading the main-sail.

Kevins, a term in Scotland for the refuse separated from grain.

Key, an instrument by which the bolt of a lock is pushed backward or forward, or clock-work machinery is wound up. — An index; that which serves to explain anything difficult to be understood. — In flooring, the board last laid down. — One of a series of levers in a piano, organ, etc., which are operated by the fingers of the performer. — *Keys* are certain sunken rocks near the surface of the water, particularly in the West Indies, from the Spanish *cayo* (an islet rock). The keys, so called, off the Florida coast, are prolific in wrecks of the larger class of vessels.

Key-Board, the finger-board of a piano, organ, or melodeon, on which the keys are exposed to view and touch.

Key-Bolt, one secured by a cotter or wedge instead of a thread and nut.

Key-Bugle, a brass horn or musical instrument with keys.

Key-Hole, the perforation in a door or lock for receiving a key.

Key-Screw, a lever, spanner, or wrench, for turning screws.

Key-Stone, the middle *voussoir*, or centre-stone of an arch.

Key-Valve, the pad or plug closing an aperture in a wind-instrument.

Key West. See FLORIDA.

Kham, a name in Turkey for cotton cloth not dyed.

Khenna, a Persian dye for the hair, used in the baths of Constantinople.

Kibble, a bucket, usually of iron, for raising ore to the surface from a mine-shaft.

Kibbling-Mill, a hand-mill of steel, attached to a post, for crushing or grinding beans, pease, malt, etc.

Kibritzka, a one-horse vehicle on two wheels, used in Siberia.

Kidderminster, an ingrain carpeting, originally named from the English town where it was principally made, but the largest quantity is now manufactured in Scotland. See CARPET.

Kid Gloves. See GLOVE.

Kidney Bean, French Bean [Fr. *haricot*], the seed of *Phaseolus vulgaris*, a variety of the bean, much esteemed both in Europe and America. See BEAN.

Kiel. See GERMANY.

Kiera, a name in India for the seeds of *Amaranthus frumentaceus*, which are ground into flour. The leaves and tender tops of another species are much esteemed by the natives, and eaten by them in their curries, or as a substitute for asparagus.

Kiffekel, a name for meerschaum.

Kikuel Oil, the produce of the solid part of the seeds of *Salvadora Persica*, imported into Bombay from Gujerat, for local consumption.

Kilderkin, a beer-cask, containing 2 firkins, or 18 gallons.

Killow, Kilo, a Turkish dry measure of very variable dimensions in different localities; in Constantinople equal to the Winchester bushel.

Kiln, an oven for drying or roasting malt and grain, burning bricks, tiles, lime, etc.; a furnace for annealing glass and pottery.

Kilo, the usual abbreviation for kilogramme.

Kilogramme, a French measure of weight of 1,000 grammes (see GRAMME), equal to about 2½ lbs. avoirdupois, or, more exactly, 2.20485 lbs.; 100 kilogrammes, or a quintal, is equal to 1.9686 cwt., 1,000 kilogrammes, or the tonneau, to 19.686 cwt. To convert pounds avoirdupois into kilogrammes, or *vice versa*, divide or multiply by 2.20485.

Kilolitre. See LITRE.

Kilomètre. See MÈTRE.

Kilostère. See STÈRE.

Kilt, a Highlander's petticoat; a loose dress extending to the knee.

Kimmel, a name in Java and the Eastern Archipelago for a liquor made from anise-seed.

Kin. See CATTY.

Kincob, an East Indian laced satin.

Kindling Wood, dry wood sawed into short lengths, split by machinery into fine pieces, and sold for kindling coal fires, etc.

King, the principal piece of a set of chessmen.

King-Post. See POST.

King's County Fire-Insurance Co., a fire-insurance Co. located in Brooklyn, N. Y., organized in 1858. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $150,000; net surplus, $192,040. Risks in force, $12,553,369; premiums, $74,578. Premiums received since the organization of the Co., $1,394,146; losses paid, $652,789. Cash dividends paid to stockholders, $342,263.

Kingston. See JAMAICA.

Kingston Metal, an alloy of tin, copper, and mercury, used for the bearings and packings of machinery.

King's Wood, a poisonous yellow pigment, chiefly consisting of orpiment.

King-Wood, one of the most beautiful of the imported hard woods, exported from Brazil in trimmed logs from 2 to 7 inches in diameter. It is believed to be derived from a species of *Triptolomæa.* It is also called violet-wood, being streaked in violet tints of different intensities, finer in the grain than rosewood, and is principally used in turning and small cabinet-work, being generally hollow in the heart, and therefore too unsound for upholstery.

Kink, a twist or bend in a rope.

Kinkbobs. See BROCADE.

Kino, an astringent gummy substance, of which there are several kinds. Much uncertainty exists regarding the origin of this commodity. East Indian kino is said to be the produce of the *Butea frondosa*, a tree or shrub common in that part of Asia; African kino is generally stated to be derived from the *Pterocarpus erinaceus*, a native of Gambia; the Australian variety is procured from the *Eucalyptus resinefera*; and the American is said to be the juice of the *Coccoloba uvifera* of the West Indies. Kino generally occurs in shining grains, of a rich ruby-red color, readily pulverizable, and nearly all soluble in water and in alcohol. In India it is used for communicating a nankeen color to cotton. It is also an article of the materia medica.

Kinsh, a lever or bar for quarrying or raising stones.

Kip, a name among tanners for the skin of young cattle, being a grade between calf and cowhide. Many kips, however, belong to full-grown cattle of small breed. — A weight for tin, in Malacca, of 40 lbs. 11 oz. avoirdupois.

Kipe, a basket for catching fish.

Kippered Fish, salmon or other fish, salted, peppered, and dried.

Kirlache, a kind of Turkish lighter, navigating the Danube, ranging from 30 to 100 tons.

Kirschenwasser, a spirituous liquor, sometimes confounded with *cherry-brandy*. It is made by pounding the pulp of cherries, fermenting, adding the broken stones or kernels, and distilling. The best kind is made in the Black Forest. It forms a favorite drink in Germany, but is not much known in this country. *Imp.* duty, same as alcohol.

Kissmiss, a small kind of grape, from which the Shiraz wine is made in Persia. When dried in the form of raisins it constitutes a large article of commerce in the East Indian markets.

Kit, a small wooden tub or vessel used for salted salmon or mackerel, usually containing about $\frac{1}{10}$ of a bushel. — A thin, flat, rectangular frame of wood, used by photographers. — A small fiddle. — A large bottle. — A milk-pail or churn. — The tools, etc., of a workman. — An outfit, as the chest of clothes of a seaman, the knapsack of a soldier.

Kitchen-Range, a fire-grate and stove with oven and boiler, etc., for cooking.

Kite, a well-known toy, formed of a slender frame of wood and packthread, rounded at one end and terminating in a point at the other, resembling in some measure a cross bow, and covered with paper. A long string is attached to the frame near its centre of gravity, by which it is held in the hand. In order that the kite may be capable of being raised, it is necessary that its flat surface be presented obliquely to the direction of the wind; a string or *tail*, carrying some light substance, is therefore attached to the sharp end of the frame, and serves by means of its gravity to maintain the proper inclination. — A name sometimes given to an accommodation bill.

Kittysoll, a paper parasol made in China, exported in boxes of 100 each.

Kitze, the Turkish name for a purse of gold of 30,000 piastres.

Kiu-Kiang. See CHINA.

Klein-Waare, Klingen-Waare [Ger.], hardware.

Knacker's Yard, a horse-killer's yard; a place where dead carcasses are taken to be cut up for their commercial uses.

Knag, the shoot of a deer's horns.

Knapping-Hammer, a stone-breaker's hammer in Scotland.

Knapsack, a bag of cloth or leather used by soldiers and pedestrians to carry their clothing.

Knead, to work off a soft mass, as of dough or clay.

Kneading-Machine, an apparatus for working dough by means of a revolving spiral.

Kneading-Trough, a deep tray in which dough is mixed by bakers and bread-makers.

Knee, in a ship, a crooked piece of timber, having two branches or arms, and generally used to connect the beams of a ship with her sides or timbers. The branches of the knees form an angle of greater or smaller extent, according to the mutual situation of the pieces which they are designed to unite. — *Knee of the Head*, or *Cutwater*, a large, flat piece of timber, fixed edgewise upon the fore part of a ship's stem, and supporting the ornamental figure or image placed under the bowsprit. — *Carling-Knees*, in a ship, those timbers which extend from the ship to the hatchway, and bear up the deck on both sides.

Knee-Cap, a cover or protection for the knee of a stumbling horse.

Knickerbocker Fire-Insurance Co., a fire-insurance Co., located in New York City, organized in 1787 as the Mutual Assurance Co., name changed to the present one in 1846. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $280,000; net surplus, $4,938. Risks in force, $16,371,944; premiums, $75,484. Premiums received since the organization of the Co. in 1846, $2,194,205; losses paid since 1846, $743,384. Cash dividends paid to stockholders since 1846, $1,316,000.

Knife [Fr. *couteau*; Ger. *Messer*; It. *coltello*; Port. *faca*; Sp. *cuchillo*], a cutting instrument for table use, and for various trades, etc., as clasp, drawing, putty, and palette knives, pocket or spring knives, desk knives, sportsmen's and gardeners' knives, penknives, fruit, ham, oyster, bread, butter, cooks', shoe, pruning, paring, plough knives, and other kinds; all of which differ in form or shape. See CUTLERY.

Knife-Basket, a tray for holding table-knives.

Knife-Board, a piece of wood, plain, or cased with leather for cleaning and polishing table-knives.

Knife-Box, a box with partitions for keeping superior table or dessert knives.

Knife-cleaning Machine, a labor-saving machine for polishing knives. Its most usual form consists of a series of brushes or leather pads which are made to revolve vertically. The knives are arranged in slits on the circumference of the case, and are subjected on each side to the revolving brushes.

Knife-Rest, a metal or glass article for a dinner-table, to rest carving-knives on.

Knife-Sharpener, a steel or tool for giving a cutting-edge to knives.

Knight, a mounted horseman; one of the pieces used in playing the game of chess.

Knister-Gold, a German name for gold-leaf or tinsel.

Knitting. See KNITTING in the Appendix.

Knob, a boss or protuberance. — The handle for a door or drawer, etc., made of wood, brass, glass, or some other material.

Knock-Down, a piece of furniture or other structure adapted to be disconnected at the joints so as to pack compactly. — *E. H. Knight.*

Knocked down to the Highest Bidder, in auction-room parlance, a sale made by the auctioneer knocking his hammer down, and thus closing the bids.

Knocker, an iron rapper or instrument for summoning at a door; a piece of wood to deaden the recoil of a wheel.

Knolls, a German name for lead ore separated from the smaller parts as they are raised from the shafts.

Knopf-Macher [Ger.], a button-maker.

Knot, a mark or division of the log-line, and name for the nautical mile of 2,208 yards, 3 knots making a marine league, and 60 knots a degree. The line knots are placed at distances of 50 feet from each other. Now, as 120 times half a minute make an hour, and 120 times 50 feet make almost a geographical mile, so many knots will run from the reel in one experiment as the vessel sails miles

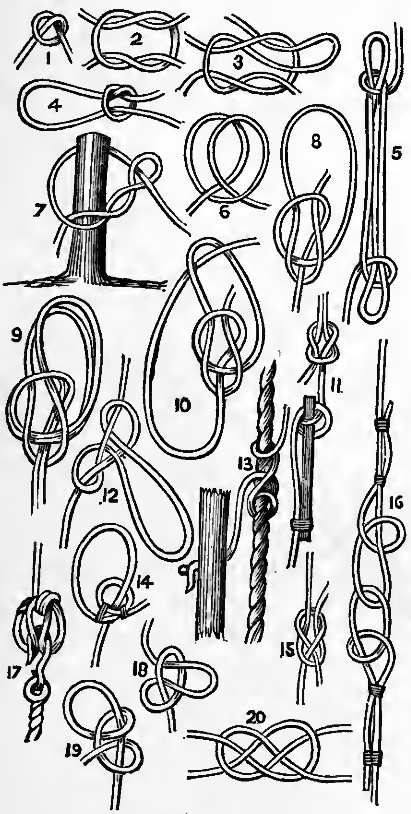

Fig. 303. — Knots.

in an hour. The knot is used for ascertaining the speed of a ship's sailing, and answers to half a minute by the sand-glass, as the log-line runs out, as a mile does to an hour; that is, it is the 120th part of a mile; hence we say the ship is going 9 knots, equivalent to 9 nautical miles, per hour. See Log-Line.

Knot is also a fastening in a rope.

The most useful knots, represented in Fig. 303, are: 1. *Thumb* or *over-hand knot*, tied at the end of a rope to prevent it from opening out, etc.; 2. *Right* or *reef-knot*, for securing all lashings where the ends of the rope meet together; 3. *Draw-knot*, which offers great facility in undoing: 4. *Running-knot*, used to bind or draw anything close; 5. *Sheepshank*, serving to shorten a rope without cutting it or unfastening the ends; 6. *Clove-hitch*, which binds with excessive force, and by which alone a weight can be hung to a smooth pole; 7. *Timber-hitch*, very useful in hauling to move a weight; 8. *Single bowline-knot*, difficult to undo, useful to throw over a post, etc., to haul on, used for the draw-loop of a slip-noose; 9. *Double bowline-knot*, for slinging a cask; 10. *Running bowline-knot;* 11. *Woolding* or *packing-stick hitch*, used to tighten ropes; 12. *Men's harness hitch*, passing over the shoulder and under the opposite arm of men drawing a carriage; etc.; 13. *Stopper-hitch*, for stoppering the fall of a tackle, etc.; 14. *Inside clinch*, for fastening a cable to the anchor-ring, etc.; 15. *Common* or *sheet bend*, a very secure method of joining two ropes, or fastening a rope to a loop; 16. *Hawser bend*, for joining two ropes, easily undone; 17. *Cat's paw*, the turn in the bight of a rope, for hooking a tackle to it; 18. *Drag-rope* or *lever-hitch*, used for fixing handspikes or capstan bars to the ropes attached to the heavy carriages, etc., which have to be moved by men; 19. *Half-hitch*, cast on the bight of a rope; 20. *Carrick bend*. A *wall-knot* is a knot made at the end of a rope to prevent it from passing through a hole. — Every knot in a rope weakens its power of resisting a sudden jerking strain. Such ropes, which will resist the strain of 10 pounds falling 8 feet, will not resist it if there is a knot in any one of them, or even if the knots used in attaching them to the point of support, or to the weights, be roughly or carelessly made. Therefore, no knot which is not absolutely necessary ought to be allowed to remain on the rope; the tighter and harder a knot becomes, the worse it is; the more loose and open a knot is made, the better it is.

Knout, the ball or piece of wood that is struck in the game of shinty. — A kind of Russian leather whip.

Knox and Lincoln R.R. runs from Bath to Lincoln, Me., 49 m. This Co., whose offices are in Bath, Me., was chartered in 1868, and the road opened in 1871. Cap. stock, $364,580; city and town bonds, $2,395,000.

Knoxville and Ohio R.R. runs from Knoxville to Careyville, Tenn., 38.25 m. This Co., whose offices are in Knoxville, was originally chartered as the Knoxville and Kentucky R.R. Co., and was assisted by the State. In 1871 it was sold in default of interest due to the State, and reorganized. Cap. stock, $1,080,100; funded debt, $500,000, consisting of 1st mortgage 20-year bonds payable 1892, interest 7 %.

Knubs, a name for the offal or waste silk in winding off from the cocoon. A large quantity is imported under the names of "knubs and husks," which is carded and spun up into various common silk stuffs.

Koark, a name in the interior of Persia for the shawl wool obtained from the double-coated goat of Angora.

Koary, a fine kind of Indian grass, used for making mats.

Kober [Ger.], a basket or dorser.

Kœsterick. See Germany (Wines of).

Koffer-Macher, a trunk-maker in Germany.

Kohl, the German name for cabbage or colewort.

Kola-Nuts, Colas, the brown seeds of the *Sterculia acuminata*, about the size of a pigeon's egg, which are very highly esteemed in Africa. When chewed or sucked, they are said to enhance the flavor of anything eaten afterwards, and also to purify putrid water.

Kommode [Ger.], a chest of drawers.

Königsbach. See Germany (Wines of).

Königsberg. See Germany.

Kopeck. See Copeck.

Korr, a Persian weight of 7,100 lbs.

Kost [Ger.], board, food, or diet; hence the compound words *Kostganger*, a boarder; *Kosthaus*, a boarding-house; *Kostschule*, a boarding-school, etc.

Koumiss, Koumis. See Beer.

Kramer [Ger.], a storekeeper; a merchant trader.

Krammes [Ger.], retail wares; commodities; articles of trade.

Kranjang, a coarse package of matting, in which sugar is exported from Java.

Kraut [Ger.], colewort or cabbage.

Kremserweiss, a pure carbonate of lead, of remarkably bright color, made in Germany.

Kreosote. See Creosote.

Kreuzer, Kreutzer, an Austrian copper coin and money of account, 100 of which make a florin or gulden.

Krint. See Denmark (*Weights and Measures*).

Krone. See Denmark (*Money*).

Kryolite. See Cryolite.

Kuchen-Zettel, a German bill of fare.

Kulit, the Malay name for skin or leather.

Kummel [Ger.], cumin, or caraway-seed.

Kummel-Wasser, a German liqueur, consisting of sweetened brandy flavored with cumin-seeds.

Kunde [Ger.], a customer; a chapman.

Kupfer [Ger.], copper.

Kupoor, the Hindustani name for camphor.

Kustenfahrer [Ger.], a coasting vessel.

Kuss-Kuss, a fibrous rhizoma of grass, which is woven in India into a fabric called *tatty*, used for awnings, sunshades, etc.

Kyanizing, is one of the modes of preserving timber from decay.

The timber is prepared as follows: A wooden tank is put together so that no metal of any kind can come in contact with the solution when the tank is charged. The solution consists of corrosive sublimate and water, in the proportion of 1 lb. of corrosive sublimate to 10 gallons of water as a maximum strength, and 1 lb. to 15 gallons as a minimum, according to the porosity or absorption of the timber subjected to the process. Oak and fir timber absorb nearly alike, but the beech, pine, elm, etc., are more porous. An hydrometer will mark accurately the strength of the solution, water being marked 0; then, when the hydrometer sinks to 6°, it denotes that the solution contains 1 lb. of sublimate to 15 gallons of water; when it rises to 17°, 1 lb. of sublimate to 5 gallons. As a general rule, when it stands midway between 5° and 10°, the solution will be the proper strength. The corrosive sublimate will dissolve best in tepid water. The period required for saturating timber depends on its thickness; 24 hours are required for each inch in thickness, for boards and small timbers. The timbers, after saturation, should be placed under a shed or cover from the sun and rain, to dry gradually. In about 14 days deals and timber not exceeding 3 inches in thickness will be perfectly dry and seasoned, and fit for use. Large timbers will require a proportionate time, according to their thickness. The solution may be used *ad infinitum*, as its strength is not diminished; but it will be advisable to ascertain occasionally by the hydrometer that it contains the required proportions of corrosive sublimate and water.

L

L, a Roman numeral denoting 50.—An abbreviation for *libra* (£, pound sterling).

Labdanum, a scarce and expensive medicinal resin, obtained from the surface of the leaves of the rock-rose, *Cistus creticus*, in Syria, etc. The best is in dark-colored masses, of a soft consistence, becoming still softer on being handled. It is greatly adulterated by the addition of black sand. It is used in plasters, in perfumery, for pastiles, and as an expectorant.

Label, a narrow slip of printed, engraved, or figured paper, or parchment, pasted or affixed to a box, bottle, or other package, to indicate the contents, name of the manufacturer, etc. For the same purpose are also used cards or tablets, which are attached to a bottle, jar, etc., by a chain, or placed in a panel.

Imp. duty: blank, or printed and figured, 25 per cent; gilt or plated, for decanter, etc., 35 per cent; in gold, silver, or German silver, for decanter, etc., 40 per cent; in copper, or copper the chief value, 45 per cent.

Laberdan, a German name for salted codfish.

Laboratory, the work-room of an experimental chemist.

Laboring of a Ship implies pitching or rolling heavily in a turbulent sea, an effect by which the masts and hull are greatly endangered; because by the rolling motion the masts strain upon their shrouds with an effort which increases as the sine of their obliquity, and the continual agitation of the vessel often loosens her joints and makes her extremely leaky.

Laborer, Laboring-man, a workman, a journeyman, one who earns his living by toil and the use of his hands at some work; not a craftsman or artisan.

Labor-saving Machines, inventions which economize or diminish human toil.

Labrador, a large peninsula of British North America, nearly of a triangular shape, extending from lat. 50° to 63° N., and from lon. 56° to 79° W. It is bounded on the S. by Canada and the Gulf of St. Lawrence, E. by the Atlantic Ocean, N. by Hudson's Straits, and W. by Hudson's Bay. *L.* is thus detached from the arctic lands, but is nevertheless a country as frozen, desolate, and barren as those on the W. of Hudson's Bay. The coast along that spacious inland sea is called East Main, and the climate there is peculiarly rigorous. The whole surface of *L.*, indeed, is as sterile and naked as any part of the globe.

The prevailing features of *L.* are rocks, swamps, and water; and vegetation appears as the last effort of expiring nature. Small, scraggy poplars, stunted firs, creeping birch, and dwarf willows, thinly scattered in the southern parts, constitute the whole of the trees. Herbs and grass are also in sheltered places to be met with, but in the most northerly parts only varieties of moss and lichens are to be found. The whole of the interior, from the aspect of what has been explored, and from the reports of the Esquimaux and other Indians, seems to be broken up with rivers, lakes, and rocks. On the coast of *L.* the winter is extremely severe, the thermometer often falling 30 degrees below the freezing-point Rum is frozen in the air as rapidly as water, and rectified spirits soon become thick like oil. From December to June the sea is completely frozen over, and so intense is the cold during the winter months, that travelling is sometimes attended with the most painful consequences. The summer months, again, are extremely hot along the coast, the thermometer rising to 86° F., when swarms of mosquitoes infest the air. The climate is not insalubrious; and, notwithstanding all its disadvantages, *L.* is of considerable importance to Great Britain. No country is better provided with large, convenient, and safe harbors, or supplied with better water; and vast multitudes of all those kinds of fish common to the Arctic seas abound on the coast. Whales, cod, salmon, and herrings are extremely plentiful. The *L.* fishery is nearly confined to the S. E. tract, opposite Newfoundland; within a few years it has increased sixfold, and now rivals that of Newfoundland. During the fishing-season about 300 schooners come down from the latter to the fishing-stations of *L.*, and about half the produce is sent to St. John's, the remainder being exported to England, Lisbon, and the Mediterranean. The American fishing-vessels average about 400, principally sloops and schooners, manned by crews varying from 9 to 13 hands, making a total of about 6,000 men. Each man catches, at an average, about 100 quintals of fish during the season; and the oil is in the proportion of 1 ton to 200 quintals. They frequent chiefly the N. part of the coast, clean their fish on board, and leave *L.* early in September. From 16,000 to 18,000 seals are taken in the spring and autumn, producing about 350 tons of oil; and the export of furs of wolves, bears, foxes, and beavers, caught in the interior, averages $20,000 per annum. The European residents are English, Irish, or Jersey servants, left in charge of the property in the fishing-rooms, and who also employ themselves in catching seals. Their principal settlements are at Bradore Bay, l'Ansele-blanc, and Forteau Bay, the last being by far the most considerable.

Labrador Tea, a popular name for the leaves of the *Ledum latifolium*, a shrub growing in the northern parts of America. From their narcotic properties, they are used medicinally, and to render beer heady.

Lac, in Hindoo numeration, denotes 100,000. A lac of rupees is therefore about $50,000; a crore is 100 lacs.

Lac [Dutch, *gomlac*; Fr. *lacque*; Ger. *Lack*; Hind. *lak'h*; It. *lacca*; Port. *laca em páos*; Sp. *goma laca*], a substance which has been improperly called a gum, produced in Bengal, Siam, etc., on the leaves and branches of certain trees by the *Coccus lacca* insect. The trees selected by the insect on which to deposit its eggs are the bihar-tree (*Croton lacciferum*), the pepel (*Butea frondosa*), etc. After being deposited, the egg is covered by the insect with a quantity of this peculiar substance, or lac, evidently intended to serve, in the economy of nature, as a nidus and protection to the ovum and insect in its first stage, and as food for the maggot in its more advanced stage. It is formed into cells, finished with as much art as a honeycomb, but differently arranged. Lac yields a fine red dye, which, though not so bright as the true Mexican cochineal, is said to be more permanent; and the resinous part is extensively used in the manufacture of sealing-wax and hats, and as a varnish. Lac, when in its natural state, encrusting leaves and twigs, is called *stick-lac*. It is collected twice a year; and the only trouble in procuring it is in breaking down the leaves and branches, and carrying them to market. When the twigs and sticks are large, or only partially covered, the lac is frequently separated from them, as it always ought to be when shipped for market, to lessen the expense of freight. The best stick-lac is of a deep red color. When held against the light it should look bright, and when broken should appear in diamond-like points. If it be not gathered till the insects have left their cells, it becomes pale, and pierced at the top; and it is of little use as a dye, though probably better for a varnish.

Lac-dye, *lac-lake*, or *cake-lac*, consists of the coloring matter extracted from the stick-lac. Various processes have been adopted for this purpose. It is formed into small square cakes or pieces, like those of indigo. It should, when broken, look dark-colored, shining, smooth, and compact; when scraped or powdered, it should be of a bright red color, approaching to that of carmine. That which is sandy, light-colored, and spongy, and which, when scraped, is of a dull brick-dust color, should be rejected. When stick-lac has been separated from the twigs to which it naturally adheres, and coarsely pounded, the native silk and cotton dyers extract the color as far as it

conveniently can be done by water. The yellowish, hard, resinous powder which remains, having somewhat of the appearance of mustard-seed, is called *seed-lac*. When liquefied by fire it is formed into cakes, and denominated *lump-lac*. The natives use the latter in making bangles, or ornaments in the form of rings, for the arms of the lower class of females; the best *shel-lac* being used in manufacturing these ornaments for the superior class.

Shel-lac is produced from seed-lac by putting the latter into bags of cotton cloth, and holding it over a charcoal fire, when the lac melts, and being strained through the bag the resinous part, which is the most liquefiable, is obtained in a considerable degree of purity; it is formed into thin sheets or plates. Thin, transparent, or amber-colored shel-lac is best. Avoid that which is thick, dark, and speckled It should always, when broken, be amber-colored on the edge. That which has a dark-brown fracture, however thin, should be rejected. When laid on a hot iron, shel-lac if pure, will instantly catch fire, and burn with a strong but not disagreeable smell. It used to be principally employed in this country in the manufacture of sealing-wax and as a varnish, but it is now very extensively used in the manufacture of hats. In Bengal, lac is chiefly produced in the forests of Sylhet and Burdwan. The finest dye is said to be obtained from the stick-lac of Siam and Pegu; but the shel-lac or resinous part obtained from the latter is inferior to that produced from Sylhet stick-lac. It may be obtained in almost any quantity.

Imp. duty: dye, crude, seed, button, stick, or shell, free.

Lace [Dutch *kanten;* Fr. *dentelle;* Ger. *Spitzen;* It. *merletti, pizzi;* Sp. *encajes*], a plain or ornamental network, tastefully composed of many threads of gold, silver, silk, flax, or cotton, interwoven. This delicate fabric appears to have claims to high antiquity, but its origin is involved in considerable obscurity. That it was worn by Grecian females is certain, and the derivation of the word *lace* (from Lat. *lacinia*, the guard, hem, or fringe of a garment) affords presumptive evidence that it was also in use among the Romans. In Venice it was very early worn; and Mary of Medicis is supposed to have been the first who introduced its use in France.

Pillow or *Thread Lace* is made by placing a perforated pattern on a hard stuffed pillow, and the thread required is wound upon bobbins, with a groove in the upper part for retaining the thread; while, to form the meshes, pins are stuck in the cushions, and threads woven or twisted round them, the pattern showing the points of insertion for the pins, and also the direction for the gimp, which is interwoven with the fine threads of the fabric to form the pattern. At the commencement of the work the bobbins are arranged on one side of the cushion, and are brought to the front side, two pairs at a time, and twisted together. The woman holds one pair of bobbins in each hand, and twists them three times over each other to form the sides of the mesh; the adjacent bobbins of each pair are next interchanged, so as to cross these threads over one another to form the bottom of the next. Supposing the four bobbins to be marked 1, 2, 3, 4, — No. 1 is twisted round 2, and No 3 round 4; these, in order to cross 2 and 3, are interchanged, so that 1 and 3 and 2 and 4 come together, and at the next twist these pairs of threads will be combined. As the meshes or half-meshes are formed, they are secured by pins. These four bobbins are now put on one side of the cushion; two more pairs are brought forward, twisted and crossed as before, and these operations are repeated until a row of meshes is formed of the required breadth, when the bobbins are worked over again to form another row. From 48 to 60 bobbins are required for every inch of breadth. Pillow or thread lace formerly employed a large number of women and children in the English counties of Bedford, Buckingham, Northampton, and Oxford, but the demand for this kind of white thread lace failed, and black lace took its place. *Honiton lace* differs from pillow lace in having the pattern made separately. The ornaments were formerly confined to simple sprigs and borders; but the fabrics now produced show extreme delicacy of execution, with beauty and taste in design; flouncings, shawls, scarfs, handkerchiefs, berthas, etc., now vary in price from 10 to 200 guineas. *British point, tambour*, and *Limerick* laces are chiefly imitation, and are produced in shawls, scarfs, dresses, court trains, flounciugs, lappets, etc. British point is made chiefly in the neighborhood of London, tambour chiefly at Islington, Coggeshall, and Nottingham, while Limerick lace is peculiar to Ireland. Black laces now occupy a considerable portion of the attention of the trade. The most celebrated laces have been classed as — 1. *Brussels*, the most valuable. There are two kinds: *Brussels ground*, having a hexagon mesh, formed by platting and twisting four threads of flax to a perpendicular line of mesh; *Brussels wire ground*, made of silk; meshes partly straight and partly arched. The pattern is worked separately, and set on by the needle. 2. *Mechlin:* a hexagonal mesh, formed of three flax threads twisted and platted to a perpendicular line or pillar. The pattern is worked in the net. 3. *Valenciennes:* an irregular hexagon, formed of two threads, partly twisted and platted at the top of the mesh. The pattern is worked in the net similar to Mechlin lace. 4. *Lisle:* a diamond mesh, formed of two threads platted to a pillar. 5. *Alençon*, called *blonde:* hexagon, of two threads, twisted similar to Buckingham lace; considered the most inferior of any made on the cushion. 6. *Alençon point:* formed of two threads to a pillar, with octagonal and square meshes alternately. — In the manufacture of lace, France takes the lead; and it is calculated that the production of lace by hand gives employment in that country to upward of 200,000 females of all ages. It is all made with bobbins upon a small pillow, except at Alençon, where the needle only is employed. The materials used are hand-spun linen thread, cotton, wool, silk, and gold and silver thread. *Point d'Alençon* is the only lace made with pure linen hand-spun thread; this thread is worth from $500 to $600 per pound. White lace is now chiefly made with cotton thread, Nos. 120 to 320. The principal seats of the manufacture are Caen and Bayeux, Chantilly and its neighborhood, Lisle, Arras, Mirecourt, Puy, Bailleul, and Alençon Each of these districts has its own peculiar style; and although the lace may be made in the same way and with the same material, in all these districts except the last, yet each is easily recognized. Silk blonde originated at Caen, and was so called from being made of undyed silk of a nankeen color: the finest white or the finest black silk is now employed. Caen and Bayeux excel all other places in the production of piece goods, and manufacture shawls, robes, mantles, etc., more extensively than any other districts in the world. By means of a stitch called *rucroe* the women of the department of Calvados join several parts into one piece so cleverly as to defy detection, even with a magnifying-glass. Most of the improvements and novelties in lace-making originate at Mirecourt; it produces the same kind of lace as Lisle and Arras, viz. clear foundation, *fonds clair*, and also *fonds de champs*, in white thread, also a lace resembling the Honiton, called *guipure*. Flowers are also made, and sewed upon the extremely fine net called Brussels net, closely resembling the Belgian fabric. The whitest and cheapest French lace is produced at Bayeux. — Belgium is the great rival of France in the manufacture of laces, the chief varieties of which are known as *Brussels, Mechlin, Valenciennes*, and *Grammont*. Brussels produces two descriptions of lace, known as *point à l'aiguille* and *Brussels plait*, the one made entirely with the needle, and the other on the pillow. The finest kind is made of very fine flax thread, and some of cotton. It is remarkably soft and clear, but very costly. Mechlin laces are made at Malines, Antwerp, etc. They are made in one piece on the pillow, and the flowers are surrounded by a plait thread, which designs the outline, and has the effect of embroidery. Valenciennes laces are made chiefly at Ypres, Menin, Courtrai, Bruges, Ghent, Alost, and their respective neighborhoods, each town having its characteristic peculiarities by which its productions are identified. Ypres produces laces of the finest square grounds, varying in price from 12 cents to $250 the English yard. — It is natural to suppose that attempts would be made to lessen the cost of production of so beautiful and costly an article as lace. It was not, however, until machinery had been largely introduced for the purpose of manufacturing textile fabrics that lace machinery can be said to have been successfully employed. About the year 1768 a framework knitter of Nottingham employed the common stocking-frame in the manufacture of lace, and about the same time another person of the same place introduced a pin-machine for making single-press point-net in imitation of the Brussels ground. Various machines were from time to time introduced, all of which, except the *warp-machine*, have been superseded by the *bobbin-net machine*, so called from the circumstance that the thread which makes the lace is partly supplied from bobbins and partly from a warp (see BOBBIN-NET MACHINE). — The *warp-machine*, invented about the year 1775, was suggested by the stocking-frame, in which only one thread is required, while in the warp-frame there is a thread to each needle. Warp-machines were the first to produce ornamental patterns on lace, such as spots, bullet-holes, etc., which had been previously embroidered or tamboured by hand. The bobbin-net machine, invented in 1809, soon became a formidable rival of the warp, and influenced its fortunes in various ways, until 1839, when the Jacquard apparatus was applied to it, and so much increased its capabilities as to introduce into the warp-lace trade a new class of products of elaborate design, such as shawls, scarfs, mits, falls, laces, etc. Of late years the *twist-machine* has been employed on similar goods, and has to a great extent superseded the warp. Great improvements have also been introduced in the methods of *dressing* lace, especially in silk goods. Many new kinds of elastic fabrics, in gloves, in silk, and other materials, have been introduced. Velvet, and velvet in combination with lace, have also been produced at the warp-frame — The textile fabric known as *gold or silver lace* consists of warp-threads of silk, or of a mixture of silk and cotton, while the weft or shoot is a silk thread covered with silver, or with silver gilt, as the case may be.

Imp. duty: All laces of cotton, gold, silver, or plated, 35 per

cent; all articles of lace, worn on the person, and made up wholly or partly by hand, and containing no wool, worsted, mohair, silk, or linen, 35 per cent. For other laces, see LINEN, SILK, THREAD, WORSTED, WEBBINGS, etc.

Lace-Bark, the reticulated bark of the *Lagetta lintearia*, a West Indian tree, which splits into layers with delicate transverse fibres, exactly resembling beautiful lace.

Lace-Boot, a boot which laces at the side or in front.

Lace-Cleaner, a laundress; one who renovates the color of antique or choice lace, or brightens gold or silver lace.

Laced-Stocking, a bandage-support or laced protection for weak legs, varicose veins, etc.

Lace-Dyer, a dyer of lace in common with other fabrics.

Lace-Frame, a machine for making lace.

Lace-Leather, a kind of leather obtained from the hides of horses.

Laceman, a dealer in gold lace, or in lace for ladies' wear.

Lace-Paper, having an open-work pattern and perforations made in imitation of lace. The process usually consists in grinding off the elevated portions of embossed paper, which is accomplished by passing the paper between two rollers, one of which is covered with ground glass or emery, the other is impressed with a duplicate of the design on the paper. The grinding-roller is made to revolve at high velocity. — *E. H. Knight.*

Lace-Runner, a female who embroiders patterns on net, stretched on a frame, following the stamped device imprinted on it.

Lacing, a fastening with a string, cord, or thong through eyelet-holes; also, the cord or string which so fastens.

Lac Lake. See LAC.

Lacquer, Lacquering. Lacquer is a varnish for metal, as distinguished from the numerous varnishes for wood. It consists of a solution of shellac in alcohol, colored by gamboge, saffron, annotto, or other yellow, orange, or red coloring matter. Lacquers are chiefly used for varnishing or lacquering brass and some other metals in order to give them a golden color, and preserve their lustre. Heat is necessary to insure the adhesion of the lacquer to the brass.

Lachryma Christi. See ITALIAN WINES.

Lactarene, a preparation of casein from milk, in extensive use among calico-printers.

Lactometer. See GALACTOMETER.

Lactoscope, a kind of eye-glass; an instrument invented by M. Donne, of Paris, for ascertaining the opacity of milk, and thus estimating the richness of the fluid in cream.

Ladder, a frame of wood or iron with connecting rounds; a flight of wooden or rope steps for climbing.

Ladder-Work, among artificers, painting, stuccoing, etc., which has to be done on a ladder, and for which extra price is paid.

Lade, to load; a freight; in Germany, a trunk or box.

Laden, a shop or stall in Germany.

Laden-Meister, in Germany, the master of a company; one who has charge of the chest, or funds.

Lading, a freight or cargo for a ship, barge, lighter, etc.

Lading, Bill of. See BILL OF LADING.

Ladle, a dipping-spoon for serving soup at table. — An iron-founder's utensil for removing molten metal. — An instrument for drawing the charge of a cannon.

Ladle-Board, a mill-wheel afloat.

Lady's Maid, the personal dress attendant on a lady.

Lady's Saddle, a quilted side-saddle, with a pummel, for lady equestrians.

Lafayette Fire-Insurance Co., located in Brooklyn, N. Y., organized 1856. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $150,000; net surplus, $134,907; risks in force, $11,110,808; premiums, $108,338. Premiums received since the organization of the Co., $2,204,379; losses paid, $1,206,045; cash dividends paid to stockholders, $285,000.

Lagan. See Ligan.

Lager [Ger.], a camp; a harbor; a warehouse or resting-place.

Lager-Beer. See BEER.

Lager-Wine, old bottled wine, that has been kept in the cellar.

Lagoon, a salt-water pond. — Land occasionally covered by the sea.

Lagrimas. See MALAGA WINES.

Lahn, a German name for plated wire; tinsel, thin metal foil.

La Guayra. See VENEZUELA.

Laid Paper, writing paper with a ribbed surface, which is cream-laid, blue-laid, etc.

Laiton [Fr.], brass.

La-kao, a Chinese green dye, obtained from *Rhamnus catharticus.*

Lake, a pigment of a fine crimson-red color, of which there are several kinds. Common *L.* is obtained from Brazil-wood, which affords a very fugitive color. Superior red *L.* are prepared from lac, cochineal, or kermes, and the best from madder root. In its wider meaning the word *lake* comprises all the combinations of alumina with organic coloring matters. So there are red *L.*, crimson *L.*, purple *L.*, yellow *L.*, and several others. Alum is usually the form in which the alumina is employed; the alumina drawing out the coloring matter from a solution of the organic substance, be it animal or vegetable. Thus alum acting upon cochineal produces the beautiful *carmine L.*; while other *L.* result from the action of alum upon Brazil-wood, madder, yellow berries, annotto, etc. The *L.* thus produced are used as pigments by calico-printers and paper-stainers.

Lake Erie and Louisville R. R., from Sandusky, O., to Cambridge City, Ind., 180 m., of which 100 m., from Fremont to Celina, O., are in operation. This Co., whose offices are in Fremont, O., was first organized in 1865, by the consolidation of the Fremont and Indiana and the Lake Erie and Pacific R. R. Cos.; sold under foreclosure in 1871; reorganized in 1872; sold again under foreclosure of 1st mortgage in 1876; and reorganized in 1877. Capital stock, $1,500,000.

Lake Shore and Michigan Southern R. R. runs from Buffalo, N. Y., to Chicago, Ill., 540.37 m.; Branches: Elyria to Millbury, O., 72.96 m.; Sandusky Pier to Depot, O., 3.74 m.; Junction to Elkhart, Mich., 130.70 m.; Junction to Jackson, Mich., 41.90 m.; Junction to Monroe, Mich., 29.50 m.; Palmyra to Adrian, Mich., 5.33 m.; Ashtabula to Harbor, O., 2.51 m.; Ashtabula, O., to Jamestown, Pa., 36.09 m.; Dunkirk Junction, N. Y., 1.50 m.; total, 324.23 m. The Co., whose offices are in Cleveland, O., owns the following lines: Detroit, Monroe, and Toledo R. R., from Junction to Detroit, 62.29 m.; Kalamazoo and White Pigeon R. R., 36.68 m.; Northern Central Michigan R. R., from Jonesville to N. Lansing, Mich., 61.14 m.; total, 160.11 m. The Co. leases the following lines: Kalamazoo, Allegan, and Grand

Rapids R. R., 58 m. in perpetuity, at a rental of $103,800 per annum. The Jamestown and Franklin R. R., 51.10 m., at a rental of 40% on gross earnings, and the Mahoning Coal R. R. and branches, 42.99 m., at same rental: total length of leased lines, 152.09 m. Total length of road operated by the Co., 1,176.80 m. Financial statement at the beginning of 1879:—

Construction (1,024.71 miles)	$68,866,354.50
Equipment	14,378,709.04
Jamestown and Franklin R.R	1,866,081.56
Material, Supplies, etc	637,577.61
Stock and Bonds	3,017,193.34
Bills receivable	514,969.91
Uncollected Earnings	316,627.19
Miscellaneous	646,740.73
Cash on Hand	1,950,698.27
	$92,194,952.15

Capital Stock, Common, $49,466,500 / " " Guaranteed, 533,500	$50,000,000.00
Funded Debt, L. S. & M. S. R.R. Co	35,500,000.00
" " D., M., & T. R.R. Co	924,000.00
" " W. P. & Kal. R.R. Co	600,000.00
December Liabilities	415,149.78
Dividend, February 1, 1879	1,510,670.00
Profit and Loss	3,245,132.37
	$92,194,952.15

Lake Trade, the trade on the American great inland lakes, carried on between the States bordering on them, and between them and the Dominion of Canada.

Llama Wool, the wool or hair of the llama, a South American animal allied to the camel. It is not quite equal in fineness to that of the *alpaca*, but is applicable to the same purposes. Very little real llama or alpaca reaches this country, the goods sold under these names being more frequently sheep's wool.

Lamaneur [Fr.], a coasting pilot.

Lamar Insurance Co., a fire and inland insurance Co., located in New York City, organized in 1872. *Statement,* Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $97,680. Risks in force: fire, $10,853,971; premiums, $123,549. Premiums received since the organization of the Co. $1,435,948; losses paid, $844,186. Cash dividends paid to stockholders, $100,000.

Lamb, the young of the sheep kind.

Lambrequin, a veil or covering attached to a helmet as a protection against the rays of the sun.

Lambskin, a kind of anthracite coal resembling coal-dust.

Lamb-Skins [Fr. *peaux d'agneaux;* Ger. *Lammsfelle;* It. *pelli agnelline;* Sp. *pielles de carderos*], the skins of the lamb, which with the fleece on are extensively used for clothing, for door-mats, etc.; the gray and black Russian lambs are mostly used for coat and cloak linings, collars, caps, etc.; the Astrachan lamb is a rich glossy, black skin, with short fur, having the appearance of watered silk. The Hungarian lamb is produced in that country in immense numbers; of it is made the national coat; the woolly part is worn outside in summer, inside in winter; they are often highly decorated. The Spanish lamb furnishes the well-known jacket of that country. The value of lamb-skins varies according to the fineness, brilliancy, and color of the wool; the black being more generally esteemed than those of any other color. Our importation of lamb-skins from Austria, England, France, Germany, etc., is considerable. Common skins, imported with the fleece on, usually colored red or blue, are used for carriage and door mats. Those without the fleece on are generally imported in hogsheads, in brine or salt; they are mostly used in the glove manufacture, and in book-binding. *Imp.* duty, see SKINS.

Lamb's-Tongue, a plane with a deep, narrow bit for making quirks.

Lamb's Wool, the fleece of the lamb.—A kind of woollen stuff.

Lame-Duck, a slang term applied to a member of the Stock Exchange who fails to meet his engagements.

Lame-Maker, a foil-maker.

Lametta, brass, silver, or gold foil or wire.

Laminated, disposed in layers or plates.

Lamp [Fr. *lampe;* Ger. *Lampe;* It. *lucerna;* Sp. *lampara*], an instrument used for the combustion of liquid inflammable bodies, for the purpose of producing artificial light. *L.* are mentioned in all the early ages; they were in use in Egypt, Greece, and Rome. Some of the specimens which have been preserved to the present time display much taste and elegance of design. The interior of all of them, however, is rough and meagre. In treating of the construction of modern *L.*, it is necessary to take into consideration that for insuring a constant and steady flame the supply of combustible matter must be steady and uniform. It must, therefore, be either in a liquid or gaseous state, so that it may approach the flame in an uninterrupted current. The combustible substance may be made to approach the flame either by capillary attraction through wicks, or by mechanical pressure. A good lamp must have the following properties: It must be supplied with carbonaceous matter and with oxygen; it must convert the former into a gaseous state; and it must bring the gas so produced into contact with oxygen at such a temperature that the carbon will combine with oxygen in the highest degree without producing smoke. The simplest way in which a lamp can be formed is that practised in making night-lights to burn in sick chambers. A small quantity of water is poured into a glass tumbler, or other vessel, and above that a quantity of oil; a piece of cork is then pierced so as to admit a few threads of cotton to pass through it, and the cork, being placed upon the oil, will float; the cotton threads will draw up the oil by capillary attraction, and a feeble but clear light will be given. The antique

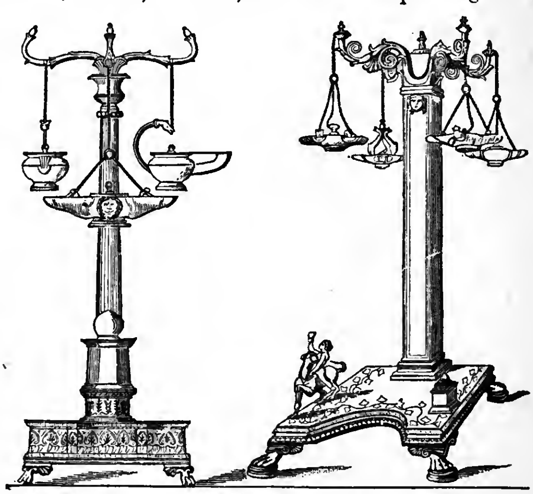

Fig. 304.—ROMAN LAMPS.

lamps spoken of before, many of which possess great artistic beauty of form, cannot claim a higher construction than those of many rude nations. In general they consist of a vessel, open or closed, with an unspun round wick, which is held by a nozzle at the beak. As combustion can take place only on the outside of the flame, more carbon is likely to be liberated from the oil than the oxygen in contact with the flame can consume. Hence all lamps of this sort give a dim light, easily go out, and possess a smoky flame. The old kitchen-lamp had the beak removed to a considerable distance from the reservoir, so as to lessen the shadow cast by the flame, and increase the illuminating power. Till 1789, however, all lamps continued to be dim, smoky, ill-made articles, soiling everything they came near, and filling the air with anything but an agreeable odor. The invention and introduction of Argand lamps at that time made a revolution in illumination; but

Fig. 305. — Kerosene Lamp.

the greatest improvement ever effected in oil-lamps was in the so-called *French moderator* (see Carcel Lamp). Since the discovery of oil-wells in this country new forms of inexpensive and portable *L.*, called kerosene *L.*, have been introduced for the purpose of consuming the oils obtained by distillation of bituminous coals and petroleum. Among the numberless burners which have been contrived with the aim of effecting the most thorough combustion of the oil, the most generally used, seen in Fig. 305, has a flat wick moved up and down by a horizontal spindle. A cap screwed upon the top of the *L.* holds the wick-tube, and a brass ring, perforated all around with holes to let in air to the wick, is tightly fitted over the cap. This ring carries a dome-shaped cover of thin brass, in the top of which is a slit or elongated opening a little larger than the wick, and directly over it, through which the flame passes up. The necessity for artificial light in mining operations below the surface, where explosive gases often impregnate the air, at an early period turned the attention of scientific men to the construction of lamps which could be safely used in an explosive atmosphere, and led to the discovery of the *safety-lamp*, for which see Fire-Damp. *Imp.* duty, according to materials.

Lamp-black [Fr. *noir de fumée;* Ger. *Kienruss*], the carbon or smoke formed by burning vegetable substances in confined air. The finest *L.* is produced by collecting the smoke from a lamp with a long wick, which supplies more oil than can be perfectly consumed, or by suffering the flame to play against a metalline cover, which impedes the combustion, not only by conducting off parts of the heat, but by obstructing the current of air. *L.*, however, is prepared in a much cheaper way for the demands of trade. The dregs which remain after the eliquation of pitch, or else small pieces of fir-wood, are burned in furnaces of a peculiar construction, the smoke of which is made to pass through a long horizontal flue, terminating in a close boarded chamber. The roof of this chamber is made of coarse cloth, through which the current of air escapes, while the soot remains. The *L.* thus prepared is not pure charcoal; it contains impurities which are driven off by heating it to redness in a vessel permitting no access of air. *L.* constitutes the basis of lithographic and printing inks, and also of an oil paint. *Imp.* duty, 20 per cent.

Lamp-Burner. See Gas-Burner, and Lamp.

Lamp-chimney Cleaner, a brush, or pad, of which there are many forms, for cleaning the chimneys and glasses of lamps. The best are made expanding, so as to bear upon opposite portions of the inside.

Lamp-Glass, the upright glass tube, or chimney, for a lamp; also the circular glass shade for a lamp or gas-burner.

Lamp-Post, the iron column or pillar for carrying a lamp.

Lamprey, a small eel-fish, the fresh-water species of which, *Petromyzon fluviatilis*, was formerly of great importance as a delicacy, and also largely used as bait by fishermen. In Germany they are taken in large quantities, fried, packed in barrels by layers, with bay-leaves and spices, and sprinkled with vinegar; and thus occasionally exported to this country.

Lana, the Italian for wool. — A Russian weight of 526½ grains.

Lanainolo [It.], a clothier; a dry-goods merchant.

Lance, a long spear, or sharp-pointed offensive weapon.

Lancet, a sharp-pointed and two-edged surgical instrument, used in letting blood, etc.

Lance-Wood, a slender tree, the *Guatteria virgata*, indigenous to the West Indies, imported in long poles, from 3 to 6 inches in diameter; is of a paler yellow than boxwood, possesses much toughness and elasticity, and is used in the fabrication of gig-shafts, archery bows and springs, surveyors' rods, billiard cues, etc.

Land, ground; soil; real estate. — To disembark.

In sea language, the word *land* makes part of several compound terms: thus, *laying the land* denotes that motion of a ship which increases its distance from the coast, so as to make it appear lower or smaller on account of the intermediate convexity of the sea. *Raising the land* is produced by the motion of the vessel toward it. *Land is shut in* signifies that another part of the land hinders the sight of that the ship came from. *Land to*, or so far from shore that it can only be just discerned. *Land turn*, a wind that in almost all hot countries blows at

certain times from the shore in the night. *To set the land;* that is, to see by the compass how it bears. *Land-breeze*, a current of air, which in many parts within the tropics, particularly in the West Indies, regularly sets from the land toward the sea during the night, and this even on opposite points of the coast. *Land-locked* is said of a harbor which is environed by land on all sides, so as to exclude the prospect of the sea, unless over some intervening land. If a ship is at anchor in such a place, she is said to ride land-locked, and is therefore considered to be safe from the violence of winds and tides. *To make the land*, is to discover it after having been out of sight of it for some time. *Landmark;* any mountain, rock, steeple, or the like, near the seaside, which serves to direct ships passing by how to steer so as to avoid certain dangerous rocks, shoals, whirlpools, etc.

Land-Agent, a manager of landed property.

Landau, a kind of carriage having a top or roof which may be opened out and thrown back.

Landed, in shipping, taken from the vessel and placed on the wharf or pier.

Landed Estate, property in land.

Land-Fall, the first land seen after a voyage.

Landing, a quay or steps, etc., for disembarking from a boat. — The level space on a staircase at the top of a flight of stairs. — A platform at a railroad station.

Landing-Pier, a jetty or wharf for landing passengers or goods.

Land-Jobber, a dealer in land; one who buys to sell again at an enhanced price.

Land-Roller, a clod-crusher and seam-presser.

Landscape, a picture representing the scenery of nature.

Landscape-Gardener, an artistic gardener; one who plots and lays out flower-gardens, shrubberies, park-grounds, etc.

Landsman, a new hand at sea; not an able seaman, or conversant with the routine of ship's work.

Land-Surveyor, one whose occupation is to determine by admeasurement and computation the superficial area and contents of portions of land, as fields, farms, etc.

Land-Warrant, a warrant or official instrument of conveyance authorizing a person to take ownership or possession of a lot or tract of public land.

Langsat, Lanseh, a delicious fruit of the Indian Archipelago, the produce of a species of *Lansium:* it has a watery pulp, with a cooling, pleasant taste.

Laniard. See LANYARD.

Lanificio [It.], woollen manufacturer.

Lansing. See MICHIGAN.

Lantern, a circular case or frame for holding a light. — A lighthouse frame.

Lantern-Wheel. See COG-WHEEL.

Lanyard, a piece of small line or rope used for fastening tackle, etc.

Lap, a roll or sliver of cotton for feeding the cards of a spinning-machine. — A wooden disk or metal wheel, on which leather, etc., is secured, used for grinding, burnishing, or polishing by the turner.

Lapacho, a useful, indestructible ship-building wood of Paraguay.

Lapidary, a jeweller; a gem-cutter; one who shapes and smooths precious stones.

Lapidary work. The substances operated on being at once very hard and very costly, peculiar mechanical tools and processes are needed by the worker in gems and precious stones. Lapidaries have established certain degrees of relative *hardness* in minerals; about 400 kinds have been compared; ten degrees of hardness have been established; the kinds have been placed under the classes which they best suit; and a *type* or representative variety has been selected for each class. Any mineral in one class can be *scratched* by any one in the next higher class, but cannot scratch it. The hardest *metal* is hardened steel; this is in Class 8. There are harder minerals in Class 9 (ruby, sapphire, corundum, etc.), and still harder in Class 10, which is occupied alone by the peerless diamond. These degrees of relative hardness determine the processes of the lapidary, which are of three kinds, *cutting*, *grinding*, and *polishing*. The lapidary's bench has a small wheel which rotates on a vertical axis. This wheel, called a mill, is the *slitting*, the *roughing*, the *smoothing*, or the *polishing* mill, according as it is made of metal, willow wood, mahogany, list, wood covered with buff-leather, etc. The powder sprinkled on the mill mainly determines the kind of work that shall be done; diamond powder, emery, and rotten-stone being the chief sorts employed. Sometimes, but not often, splitting can be effected by means of natural cleavage in the stone. More frequently stones are divided into pieces by means of a thin iron wheel called a *slicer*, the edge of which is touched with diamond powder, and is used like a circular saw. Where a stone is ground down into shape without splitting or slicing, it is applied to the flat surface of a horizontal mill or revolving plate, mostly metal, touched with diamond powder or emery. Whether grinding or polishing, the principle of action is much the same; the flat side of a revolving mill or disk is touched with powder, and the stone is held against it in various ways. The powder is mixed with oil, or with water, and applied as a kind of paste. In grinding away the far-famed *Koh-i-noor*, to give increased brilliancy by a better arrangement of facets, it was held against a mill or disk rotating 2,000 times in a second; the rotating was produced by steam-power, and the process was continued during several weeks. As a general rule, *slitting* is done with diamond powder and oil on an iron mill, *grinding* with emery powder and water on a leaden mill, and *polishing* with rotten-stone and water on a tin mill.

Lapis-Lazuli, a valuable deep-blue ornamental stone, which is a silicate of alumina and lime, colored with variable amounts of iron and sulphur. It was formerly the only source of ultramarine, but this beautiful pigment is now artificially manufactured.

Lappet-Muslin, a white or colored, sprigged or striped muslin for dresses, etc.

Lapping, a kind of machine blanket or wrapping material, used by calico-printers, etc., and made either plain, twilled, or fine.

Lapping-Engine, a doubling machine; an engine for making folds or welds.

Lappior, a miner who dresses the refuse ores which are left.

Lapmude, a dress made of reindeer's skin.

Lapstone, a shoemaker's stone for hammering his leather on.

Larboard, the left-hand side of a ship, looking forward.

Larch. In the catalogue of soft timber used in ship-building, the *larch*, or *hackmatack*, is not the least useful, — the latter name is the aboriginal. It is a tree of the fir tribe (*Abies larix*), which sometimes attains an altitude of 70 feet, but is usually found from 40 to 50 feet. It is generally of straight growth, but quite tapering. It grows rapidly, is of great strength, and its durability exceeds that of the oak. It is distinguished for the closeness of its grain, is very compact, and of reddish color; and for knees and top-timbers of vessels, particularly steam-vessels, is unequalled. This fact should, however, be retained, that, its strength being quite out of proportion to its density, it should always be fastened with square iron; under such circumstances it is superior to oak. This timber is extensively cultivated in Europe, and is not a rare specimen of vegetation in the New England States.

Lard, the hog's fat after being separated from membranes and blood by the process called *rendering*, which consists in melting it out at the temperature of boiling water, commonly with the mixture of a small quantity of water. It is then run into kegs. The best qualities, however, are collected into bladders, and are distinguished by the name of bladder *L.* In the pig, the fat differs from that of almost every other quadruped, as it covers the animal all over, and forms a thick layer between the flesh and the skin, not unlike the blubber in whale. The fat which surrounds the kidneys yields the best and finest lard, which should be white, pultaceous, somewhat tough, without smell, of a sweetish taste, and melting at 212° F. with-

out bubbling, and without depositing any sediment. *L.* is applicable to various purposes in medicine, cookery, and the arts. In the former case it is known as *adeps*, and is specially useful in making ointments and cerates. *L.* is chiefly produced in Illinois, Ohio, and other Western States, and is extensively exported. See HOG.

Imp. duty, 2 cts. per lb.

Mutton suet, starch, potato flour, caustic lime, and other adulterating substances are mixed with *L.*, to render it harder. Frequently also alum is added to it, to increase its whiteness. The presence of water and its quantity may be ascertained by submitting a weighed portion to moderate heat; it escapes in bubbles, and when these cease to appear the loss of weight indicates the proportion. If starch is present, it will cause a solution of iodine with which a particle of the *L.* is mixed to turn blue or even black. The proportion of the adulterating ingredients sometimes amounts to more than 25 per cent, of which the chief article is some farinaceous substance.

Lard oil, or *oleine*, is obtained by removing stearine and margarine from lard by pressure at a low temperature. It is very pure and white, when good; but is of a brownish color when pressed from burned or scorched *L.* Winter lard-oil is obtained by subjecting this oil to the influence of a cold temperature until it granulates, and then re-pressing it. It forms an excellent lubricant for machinery, and is also used for burning, in the manufacture of soaps and candles, in woollen manufactures, etc. The manufacture of lard oil is carried on on an immense scale in this country, principally in Chicago and Cincinnati, and is a very important article of our national commerce. For the year 1878, 1,651,648 lbs., valued at $994,440, were exported, chiefly to Great Britain and France.

La Rochelle. See FRANCE.

Lascar, a Hindoo seaman, employed on board vessels trading to the East Indian ports; also a menial employed to do the dirty work of the artillery and the arsenals in India. The term is derived from *lushkur*, literally, an army man.

Lashes, the thongs of whips, made of cord or twisted strips of hide.

Lashing, baling-cord; rope for binding packages.

Lasso, a strong rope of leather thongs with a running noose, carried by the gauchos or mounted herdsmen, in Patagonia and Buenos Ayres, for catching wild cattle.

Fig. 306. — LOW-JOINTED LAST AND STANDARD.

Last, an uncertain quantity, varying in different countries, and with respect to different articles. Generally, however, a last is estimated at 4,000 pounds; but there are great discrepancies. The following quantities of different articles make a last, viz.: 14 barrels of pitch, tar, or ashes; 12 dozen of hides or skins; 12 barrels of codfish, potash, or meal; 20 cades, each of 1,000 herrings, every 1,000, 10 hundred, and every 100, five score; 10½ quarters of cole-seed; 10 quarters of coan or rape-seed. In some parts of England, 21 quarters of corn go to a last; 12 sacks of wool; 20 dickers (every dicker 12 skins) of leather; 18 barrels of unpacked herrings; 10,000 pilchards; 24 barrels (each barrel containing 100 lbs.) of gunpowder; 1,700 lbs. of feathers or flax. *Last* is sometimes used to signify the burden of a ship. — A mould placed inside a shoe, to give shape to the upper and hold the parts, which are tacked thereto ready to pegging. They are sold at the shoe-finding stores.

The last shown in Fig. 306 is simple in its construction. The expansion of the last holds the shoe firmly, and gives a solid bearing to the whole bottom of the shoe; by this means the work is more quickly and perfectly done than it can be by any other way.

Lasting, the process of drawing the upper leather smooth and straight in shoemaking. — A strong worsted fabric, used in making women's shoes.

La Tache. See BURGUNDY WINES.

Latakia, a fine kind of Turkish smoking-tobacco, taking its name from the port of shipment.

Latch, a door catch, or fastening.

Latchet, a shoe-buckle.

Latch-Key, a small private key for a street-door.

Lateen Sail, a long, triangular sail, extended by a lateen-yard, which is inclined at an angle of 45°. It is frequently used in *Xebecs*, *Polacres*, *Setees*, and other vessels which navigate in the Mediterranean Sea.

Lath [Fr. *latte*; Ger. *Latte*], one of the long, thin, and narrow slips of wood, nailed to the rafters of a roof or ceiling in order to sustain the covering.

Laths are distinguished into various sorts, according to the different kinds of wood of which they are made, and the different purposes to which they are to be applied. They are also distinguished, according to their length, into five, four, and three feet laths. Their ordinary breadth is about an inch, and their thickness a quarter of an inch. Laths are sold by the bundle, which is generally called a hundred; but seven score, or 140, are computed in the hundred for three-feet laths; six score, or 120, in such as are four feet; and for those which are denominated five-feet, the common hundred, or five score.

Lathe, an apparatus used by turners, which gives a revolving motion to an article of wood or metal while being turned.

In the *centre L.* the work is supported at both ends, while the cutting tool is applied at the space between them. By means of puppets, or short upright posts, an iron pin, and a screw and nut, two sharp steel points are made to stick into the ends of the work, and hold it fast. A treadle, worked by the foot of the turner, causes the piece of wood or metal to rotate rapidly. A horizontal *rest* supports the tool during the work. The *Chuck L.* supports the work only at one end, thus enabling the turner to apply his tools to the other. Pieces called *chucks* are used, screwed up to the end of a mandril; each chuck being adapted to hold a particular kind of work. It is especially for making hollow work, such as the insides of wooden bowls and cups, that the chuck or mandril *L.* is useful. — Other names are given — *spindle*, *mandril*, *pole*, *hand-wheel*, *foot-wheel*, *power*, *bed*, *bur*, etc. — to *L.* of various kinds. Some are turned by a foot-treadle, some by a hand-wheel, some by steam-power. Some are small and simple enough to turn a little wooden bobbin; while others, in the great engineering workshops, are so powerful as to turn vast wheels and cylinders of iron and steel. See TURNING.

Latitude and Longitude. The distance from the equator to the poles, along a meridian, is called *latitude*, or width; the distance from an assumed prime meridian, along a parallel, in the direction of the earth's rotation, is called *longitude*, or length. The degrees of latitude are counted from the equator as zero, both N. and S., making 90° each way to the poles. It would be most desirable that all civilized nations should also agree on a prime meridian from which the degrees of longitude should be uniformly counted; but it is not so. The English count 180 degrees east and 180 degrees west from the meridian passing through their national Observatory at Greenwich, near London;

the French start from the meridian of their observatory at Paris; the Germans often take the meridian of Ferro, the most western of the Canary Islands, because it leaves all the lands of the Old World to the E., and those of the New World to the W.; the Americans often use the meridian of the National Observatory at Washington. Therefore, when the longitude of a place is mentioned, the prime meridian from which it is reckoned must be indicated. The seafaring nations mostly use Greenwich longitude; the nations on the continent of Europe, Paris and Ferro. — The relative position of these prime meridians is such that, Paris being zero, Greenwich is 2° 20′ 22″ W., and Ferro is assumed to be 20° W. from the Paris meridian. Washington is 79° 23′ 28″ W. from Paris, and 77° 3′ 6″ from Greenwich. The latitude and longitude of a point being known, it is evident that its true position on the surface of the globe is fully determined.

The meridians being all great circles, the length of their degrees, or of the degrees of latitude, is about uniform; they only show slight elongation towards the poles, due to the polar compression. But the degrees of the parallels which mark the longitudes are rapidly decreasing with the circumference of the circles from the equator to the poles, as shown in the following table. —

Length of Degrees of Longitude in different Latitudes, in English Miles.

Degrees of latitude	Length of degrees	Circumf. of parallel.	Degrees of latitude.	Length of degrees.	Circumf. of parallel.
Equator.	69.16	24,899	50°	45.55	16,037
5°	68.90	24,805	55	39 76	14,314
10	68 12	24,523	60	34.67	12,482
15	66.82	24,056	65	29 31	10,553
20	65.02	23,407	70	23.73	8,542
25	62.72	22,580	75	17.96	6,466
30	59.95	21,581	80	12.05	4,339
35	56.72	20,419	85	6.84	2,464
40	53.06	19,101	90	0.00	Pole
45	48.99	17,636			

The length of a minute of a degree of the equator is called a *geographical* mile, of which, therefore, there are sixty in one degree This is the same as the nautical mile, used by all mariners in computing distances at sea. One degree of the equator contains 69.16 English statute miles. — *Finding the Difference of Longitude between two Places.* As the earth revolves on its axis, each meridian is carried over 360 degrees in 24 hours, or 1,440 minutes, and over one degree in 4 minutes, whatever be the length of the degree. The difference in longitude of two places can therefore be expressed by the difference in time of their meridians. That difference of 4 minutes for each degree is uniformly the same in all latitudes. A traveller going westward one degree of longitude, with a good watch, will find it 4 minutes ahead of the time of the place; when travelling eastward, 4 minutes behind. When leaving New York, for example, and arriving at London, if we find the watch to be 4 hours and 56 minutes, or 296 minutes, behind the London — or, rather, the Greenwich — time, we conclude that the difference of longitude between the two places is $\frac{296}{4}$, or 74 degrees. Leaving New York for the Pacific coast, if we find that the time-keeper, which brings the true time of that place, marks 3h. 14m. P. M. when it is noon at San Francisco, we again conclude that the difference of longitude between the two places is 194 minutes of time, which, divided by 4, makes 48° 30′ W. of New York, and 122° 30′ W. from Greenwich. — *Johnson's Encyclopædia.*

Latten, a name sometimes applied to sheet or plate brass, or thin plates of mixed metal; black *L.* is brass in milled sheets, composed of copper and zinc, used by braziers, and for drawing into wire. Shaven *L.* is a thinner article. Roll *L.* is polished on both sides ready for use.

Latten-Wire, wire made from the plates.

Lattice, a trellis or cross-barred work. — A network window.

Laubenheim. See GERMANY (WINES OF).

Laudanum. See OPIUM.

Launch, in sea language, signifies to put out; as, launch the ship; that is, put her out of dock. Launch aft or forward, speaking of things that are stowed in the hold, is, put them more forward. Launch, ho! is a term used when a yard is hoisted high enough, and signifies, hoist no more. — Also a name for the long-boat or large boat of a ship.

Launching. Most ships are built with the stern towards the river or sea, in a *slip*, or dry dock. The level of the ship descends towards the water, and the ship is built upon timber supports of a suitable kind. When ready for launching, the ship is on a kind of cradle which rests on greased timbers; these timbers, when various subsidiary arrangements have been made, slide over other greased timbers, and carry the ship out into deep water.

Laundress, a washerwoman.

Laundry, the place where washing is carried on; an ironing-room.

Laurel, a handsome and interesting genus of trees, furnishing many important articles of commerce. The true or noble *L.*, *Laurus nobilis*, is noticed under BAY, its common name. The *Kalmia latifolia* (Fig. 307) is a large evergreen shrub, or low tree, growing in favorable situations to a height of 15 to 20 feet. Its flowers, which put

Fig. 307. — LAUREL (*Kalmia latifolia*).

forth from May to July, are sometimes of a pure white, tinted with pale pink, delicately spotted; but, in general, they are a beautiful rose-color, and are destitute of odor. They are disposed in corymbs at the extremity of the branches; and, as they are always numerous, their brilliant effect is heightened by the richness of the surrounding foliage. This tree is indigenous to North America, from Canada to Carolina. It rarely occurs, however, north of the 42d or 43d degree of north latitude, and is but sparingly produced in Kentucky and Western Tennessee, and disappears entirely in the Southern States, wherever the rivers enter the low country, or where the pine-barrens begin. Although it is comparatively abundant along the rivers of the Middle and Southern States, it is nowhere seen more profusely multiplied, nor of a greater height and of more luxuriant vegetation, than in North Carolina, on the loftiest parts of the Alleghanies.

The wood of the *Kalmia latifolia*, particularly that of the roots, is very compact, fine-grained, and marked with red lines. When green, it is of a soft texture, and is easily wrought; but, when well seasoned, it is very hard, and more nearly resem-

bles the European box than any other American wood. It is sometimes employed for the handles of light tools, for screws, boxes, etc. The leaves are used in medicine.

The Cherry-Laurel (*Prunus lauro-cerasus*), one of the most popular evergreens in English pleasure-grounds, has racemose flowers, pale evergreen oblong-lanceolate leaves, and is so hardy that neither frost nor drought seems to affect it. The leaves, which, when fresh, are often employed to give a flavor to culinary preparations, are poisonous from the abundant hydrocyanic acid which they contain, and should be used with caution.

Laurel-Water, a cordial obtained by distillation from the leaves of the cherry-laurel (see LAUREL). It is used medicinally, as a substitute for hydrocyanic acid, in palpitation of the heart, etc.

Lava, the scoria from active volcanoes, which is used for several purposes.

Lava-Millstones, hard and coarse basaltic millstones, obtained from quarries near Andernach on the Rhine.

Lavandara [It.], a washerwoman.

Lavender, a plant, *Lavendula vera*, yielding the well-known oil and distilled waters which bear its name and are extensively used in perfumery. Both of these are obtained in greatest proportion from the flower-spikes which have been gathered in dry weather before they are fully expanded. The dried flowers are used to make *sachets*, or scent-bags, for perfuming drawers. Considerable quantities of *L.* are grown for the market near Philadelphia. From the floral leaves of the French or spike-*L.* (*lavendula spica*) the oil of spike is obtained, which is used by painters on porcelain, and by artists in the preparation of varnish.

Imp. duty: flowers, essence, and oil, free; water, 50 per cent.

Law Merchant, the old term for commercial law, embracing the law of shipping, — including that of maritime insurance, the law of negotiable bills of exchange and promissory notes, and the law of sales, — all of which are treated separately in other parts of this work.

The commercial law of the U. States is, in general, the same with that of England. The principles connected with it are almost always traceable to the latter source; modified, however, by the legislation of individual States as well as by the decisions of the federal court of the Union, and other inferior tribunals. English laws are not valid as such. They must be sanctioned by legislative enactment, or introduced by a court, as an exposition of principles common to the two nations. Each State has a separate commercial legislation. This is founded either on express statute, or on decisions of court. But as the decrees of the different courts have a sort of authority of themselves, and as, in addition to this, questions in relation to commerce emanate from general principles, or consist only in determining the proper interpretation of the contracts, commercial law may be said to be the same, or, at least, to vary very inconsiderably throughout the Union. Numerous questions on commercial affairs are decided by the federal courts of the Union (district and circuit courts), held for the purpose of taking cognizance of civil disputes between inhabitants of different States, and of all cases of admiralty and maritime jurisdiction. The final revision of the decisions of these courts is generally competent to the Supreme Court of the U. States, which, differing from the Court of Cassation in France, judges both in regard to fact and law; and the decrees of which, while not considered as determining the principles of legislation or jurisprudence, have, indirectly, great influence in giving uniformity to the decisions of inferior courts in the several States of the Republic. Though each State is in itself independent, yet laws of a general and uniform character may be enacted by Congress For example, article 1st of section 8 and section 4 of the Constitution of 1787, provides that Congress shall have the power, in the matter of bankruptcy, — a subject of so grave interest in America, and affecting so deeply public credit, — to enact laws that shall be obligatory on all the States, and take place of local enactments, whatever these may be. Under a general view, the tribunals must form their decisions on the basis of four sufficiently defined elements: 1st. The common or imperfectly written law; 2d. The statutes of the particular States; 3d. The legislative acts of Congress; and 4th. The decisions of English courts and treatises on English jurisprudence to which lawyers are permitted to appeal, as *raison écrit*, professional decision reduced to writing. There are no tribunals of commerce in the U. States. Commercial or maritime questions are determined in the first instance by the ordinary courts appointed in each State. There are many exceptions, however, viz.: 1st. Of maritime civil causes, such as seamen's wages, mortgages, salvage, engagements of vessels, etc., in general, of every real action against the vessel, or even in certain cases against the cargo; 2d. In the case of seizure of the ship or cargo; 3d. In regard to patents for discovery, rights of authorship, etc; and 4th. In an action intended by a citizen of one State against a citizen of another. In all these cases the jurisdiction devolves on the federal court of circuit or of district. Though the judges have no political privileges, they possess, each in his own sphere, great power; inasmuch as they may refuse to apply the law on the ground of unconstitutional impropriety in particular cases brought before them, — an ingenious but sure method of fixing the character of imperfection on a particular law.

Lawn [Fr., Ger. and It. *linon;* Sp. *cambray clarin*], a species of very fine linen, approaching cambric; manufactured in France, Belgium, Ireland, and Scotland. There is also cotton lawn.

Lawrence, St., an important river of North America, forming part of the N. boundary of the U. States, and watering the finest portion of British America, rises, under the name of the St. Louis, in lat. 47° 45′ N., lon. 93° W., flows E., and enters the S. W. extremity of Lake Superior. Passing through the chain of Great Lakes, it quits Lake Ontario at Kingston. Here it takes the name of the Iroquois, and flowing N. E. forms the wide expanses called Lakes St. Francis, St. Louis, and St. Peter. It is first called St. Lawrence after passing Montreal. Below Quebec it forms a broad estuary, and it enters the Gulf of St. Lawrence at Gaspé Point by a mouth 100 m. wide. Length, from Lake Ontario to the Gulf, 650 m.; entire length, 1,800 m. The basin of the St. Lawrence is estimated to contain 297,000 sq. m., of which 94,000 are covered with the waters of the Great Lakes. The river receives many important tributaries from the N., but none of any size from the S. The tides rise to the district of Three Rivers. Ships of the line ascend to Quebec, and steamers of 3,500 tons to Montreal. The navigation is continued hence by canals to Kingston and Lake Ontario. — The *Gulf of St. Lawrence* is an inlet of the Atlantic Ocean, British North America, having Newfoundland on the E., Labrador, Lower Canada, and New Brunswick on the N. and W., and Nova Scotia and Cape Breton on the S., extending from lat. 46° to 51° 30′ N., and lon. 58° to 65° W. It communicates with the ocean by three channels, the principal of which is between Cape Breton and Newfoundland, 48 m. in width at its narrowest part. The other two channels are much narrower; the Straits of Belle Isle, between the N. extremity of Newfoundland and Labrador, being 10 m., and the Gut of Canso, betwixt Cape Breton and the main land, being only about half a mile in width at the narrowest part. The Gulf is about 300 m. in length, from N. to S., by 240 m. in breadth, and encloses numerous islands, the chief of which are Anticosti in the N., the Magdalen group in the centre, and Prince Edward Island in the S. The estuary of the St. Lawrence River debouches into the Gulf at the W. extremity of Anticosti, although, properly speaking, this firth is an inlet of the Gulf as far up as the river Saguenay. Navigation is suspended here during winter and early spring, from the prevalence of ice, which is especially dangerous in the entrance to the Gulf. Fogs also are very frequent during the prevalence of the E. winds in spring. In summer, however, the W. and S. W. winds render navigation comparatively safe.

Lawyer, a name indiscriminately applied to any one practising law, whether attorney or solicitors, barristers, special pleaders, counsellors, or advocates, judges, etc.

Lay, to produce eggs. — A share of the freight of a ship. — Land in the state of grass or sward.

Lay-Days, a certain number of days allowed to the merchant or charterer to load or unload cargo. See AFFREIGHTMENT, DEMURRAGE.

Layer, one body laid or spread over the surface of another; a bed; a stratum; as, a *layer* of mould. — In building, a course, as of brick, stones, etc. — In gardening, a twig or shoot of a plant, not detached from the stock, laid under ground for growth or propagation; as, to give *layers* of fresh earth. — In tanning, a pit containing a strong solution of tannin; a bloomer. — In leather manufacture, a welt, or strengthening strip.

Layering, in gardening, binding down the shoots of shrubs, in order that they may strike roots.

Lay-Figure, an artist's model to hang drapery on; a figure made of wood or cloth in imitation of the human body.

Laying, the process of twisting the strands of hemp into a rope. — Producing eggs.

Laying-on Tool, a bookbinder's tool, used to lay on the gold-leaf to the cover or the edge.

Lazaretto. See QUARANTINE.

Lb., the abbreviation for the pound weight.

Le, a Chinese superficial measure, about 631 yards.

Lea, a yarn measure, sometimes called a rap, containing in cotton yarn 80 threads, or 4,320 inches; for linen yarn 120 threads, or 10,800 inches; for worsted yarn 80 threads, or 2,880 inches. The lea, as applied to foreign linen yarn, contains 3,420 Ermland inches, and 40 threads; 7,200 Hamburg inches, and 90 threads; 7 German skeins, 100 threads in a skein.

Leach, a vat or chamber in which a body is placed, in order that its soluble portions may be removed by soaking and infiltration. It is a filtering operation in which the liquid removes the soluble matter from the material through which it flows. A familiar instance is in the formation of lye from ashes. (*E. H. Knight.*) The border or side edge of a sail.

Leach-Line, a rope used for hauling up the leach of a sail.

Lead [Fr. *plomb;* Ger. *Blei;* It. *piombo;* Port. *chumbo:* Sp. *plomo*], a soft and flexible metal, of a pale livid gray color, easily malleable, but slightly tenacious and not sonorous. Sp. gr. 11.35. It melts at 612° F., — a much lower heat than affects most other metals. Exposed in the open air, it soon tarnishes; but the oxidizement never proceeds far. Water, when pure, does not act upon it, though it greatly facilitates the influence of the external air.

L. is of common and extensive use in the arts. Alloyed with tin, in different proportions, it forms *solder* and *pewter;* and with antimony it constitutes *type metal.* Combined with oxygen it forms *massicot*, a protoxide of a pale yellow color; *litharge*, also a semi-crystalline protoxide, obtained in separating silver from *L.* ores, enters largely into the composition of flint-glass; *minium*, or *red L.*, a deutoxide, extensively used as a paint, and also in the manufacture of flint-glass; the carbonate of *L.*, or *white L.*, is a dense white powder, commonly employed as a pigment; the chromate of *L.*, of a beautiful yellow color, is also much used as a pigment; and the acetate of *L.*, called *sugar* of *L.*, is employed for various purposes. The pure metal is used for numerous machines and utensils; but its chief employment is in the form of sheets, pipes, and shot. *Sheet-L.* is melted and cast; the thickness of the sheets being frequently reduced by means of heavy rollers worked by steam-power. The sheet is of different thicknesses, but always weighs 9 cwt., so that its length and breadth will be greater in proportion to the diminution of its thickness. In trade, the sheets are described as being of so many pounds weight to the superficial square foot. *L. pipes* are sometimes made in a rough way by bending sheet-*L.* over a mandril, and soldering the edges together; but more commonly by casting the pipe in an iron cylinder, having a concentric iron rod or core, and afterwards drawing the pipe through a succession of holes in steel plates diminishing gradually in diameter, whereby the pipe is lengthened, while its substance is reduced; and the machinery employed for this process is now so perfect, that a faulty pipe is rarely met with. *L. shot* is prepared by pouring molten lead, in a peculiar manner, through a colander, or perforated plate, placed on the top of a high tower, from whence the globules descend into a tub of water on the floor: the shot thus made is of various sizes, but it is afterwards sorted by means of a series of sieves having meshes of different degrees of fineness. — *L.* used to be extensively employed in the formation of water-pipes and cisterns. But though water has no direct action on lead, it facilitates the action of the external air; and hence the lead of cisterns and of pipes from which the air is not entirely excluded becomes oxdized, and is covered with a white crust at the point where the surface of the water comes into contact with the air. Inasmuch, however, as this oxide is extremely deleterious, *L.* pipes and cisterns are now very generally superseded by those of cast-iron. Its salts, though poisonous, are used in medicine to form sedative external applications; and frequently not a little, by the disreputable wine-merchant, to stop the progress of acetous fermentation. Wine thus poisoned may, however, be readily distinguished; a small quantity of the bicarbonate of potash added to the adulterated wine producing a white precipitate, and sulphuretted hydrogen

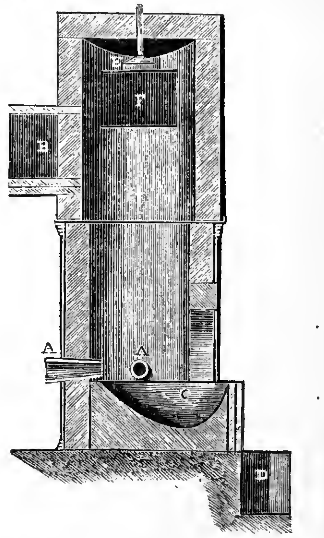

Fig. 308 — LEAD-SMELTING FURNACE.

a black one. Pure wine will not be affected by either of these tests. — The chief ore of lead is *galena*, a sulphide of lead This ore might, at the first glance, be mistaken for the metal itself, from its high specific gravity and metallic lustre. It is found forming extensive veins in Cumberland, Derbyshire, and Cornwall (England), traversing a limestone rock in the two first counties, and a clay-slate in the last (see GREAT BRITAIN, page 475). Spain also furnishes large supplies of this important ore. Galena presents a beautiful crystalline appearance, being often found in large isolated cubes, which readily cleave or split up in directions parallel to their faces. Considerable quantities of sulphide of silver are often present in galena, and in many specimens the sulphide of bismuth and antimony are found Though the sulphide is the most abundant natural combination of *L.*, it is by no means the only form in which this metal is found. The metal itself is occasionally met with, though in very small quantity, and the carbonate of lead, *white lead ore*, forms an important ore in the U. States and in Spain. The sulphate of *L.* is also found in Australia, and is largely imported into England to be smelted In the U. States the most important galena deposits are found in the Mississippi Valley. There are two prominent localities, known as the upper and lower mines, the latter in Missouri, the former included within the bordering states of Wisconsin, Illinois, and Iowa. The extent of the upper-mines region is about 4,000 sq. m., of which about 2,200 sq m. is in Wisconsin. The most productive portion of the region is that which lies between Dubuque, Galena, and Shallsburg, so that Iowa and Illinois raise more lead in proportion to the area over which mining operations have been conducted than Wisconsin does. Galena occurs also in New York, at Rossie, St. Lawrence Co., and in Sullivan, Columbia, and Ulster Cos.; in Maine, veins of considerable extent exist at Lubec Bay, Bingham, and Parsonsville; in New Hampshire, at Eaton, Haverhill, Bath, and Tamworth; in Vermont, at Thetford; in Connecticut, at Middletown; in Massachusetts, at Southamp-

ton, Leverett, and Sterling; in Pennsylvania, at Phœnixville and elsewhere; in Virginia, in Wythe Co, Louisa Co., and other places; in Michigan, in the region of Chocolate River, and elsewhere, and Lake Superior copper districts; in California and territories E. of the Rocky Mountains, and many of the gold mines Many of these mines have been and are still being worked, to great pecuniary advantage, at different localities in the U. States, while others again have proved unprofitable, and the mines have been abandoned, although some of them would have justified continued operations. The U. States, which formerly imported yearly, from England only, 20,000 to 30,000 tons of *L.*, now produce this metal largely enough for all domestic wants, and even for exportation. For the year 1878 our imports of pig, bar, and old *L.*, chiefly from Spain, England, and Mexico, amounted to 7,881,216 lbs., valued at $353,936, of which 1,129,932 lbs., valued at $57,553, were re exported; the exports of raw and manuf. *L.* were valued at $314,904, besides cartridges and shot.

Manufacture. When the lead ore, galena, or sulphuret has been brought up from the mine, picked, broken, washed, and cleansed (see ORE-DRESSING), it is ready to have the metal extracted from the earthy impurities by the following processes. — *Roasting.* Different methods of roasting and smelting are followed in different districts; but the following is the most usually adopted: The ore is roasted on a long flat hearth covered by a low arch, being one of the many varieties of reverberatory furnace. About 10 cwt. of ore is exposed for three hours to a heat which will partially oxidize and get rid of the sulphur, carrying with it some of the antimony and other substances. — *Smelting.* The roasted ore is thrown into a peculiar kind of furnace called an *ore-hearth;* neither like a reverberatory nor a smelting furnace, but being a rectangular chamber (Fig. 308), furnished with 3 blast-pipes, A. The *L.* ore and blast are charged in at B, and the metal runs into a cavity, C, at the bottom of the furnace, while the slag flows over into a reservoir, D, outside the furnace. With the roasted ore is introduced a certain proportion of *browse* (ore only partially reduced at the preceding smelting), coke, and coal. Here, by careful watching, heating, and stirring, the lead (with whatever silver it may contain) is separated from nearly all the other components of the ore, and is received in moulds, which give to it the form of *pig-L.*

Imp. duty: Ore and dross, 1½ cts. per lb.; old scrap, fit for remanufacture only, 1¼ cts. per lb.; bars of pigs, 7 cts. per lb.; pipes and sheets, 2¾ cts. per lb.; pencils (in wood), 50 cts. per gross and 30 per cent; pencils (not in wood), $1 per gross; nitrate, 3 cts. per lb.; sugar of *L.* (brown), 5 cts. per lb., (white), 10 cts. per lb.; white and red, dry or ground, in oil, 3 cents per lb.; manuf. of *L.*, n. o. p. f., 35 per cent.

Lead. On shipboard, the *lead* is a cone or pyramid of this metal, with a small hole at the base, attached to a line, for taking soundings at sea. The common hand-lead for shallow depths weighs about 7 lbs., with about 20 fathoms of line. The leadsman stands somewhere on the side of the vessel, leaning against a band for the purpose; lets the lead descend near the water; then, swinging it over his head once, or twice, if the ship is going fast, throws it forward. The line is marked at 5, 7, 10, 13, 17, and 20 fathoms. The numbers between are called *deeps;* thus, "by the mark 7," "by the deep 9," indicate 7 and 9 fathoms. When the depth is great, the deep-sea lead of about 25 lbs. is used. The lead is dropped from the forepart of the vessel, the line being passed outside all. It is generally necessary to heave the ship to.

Lead-Bath, a process for the extraction of gold or silver from comminuted ore by exposing it mechanically to molten lead, with which it forms an alloy.

Leader, a principal or editorial article in a newspaper. — The chief wheel in any body of machinery. — In mining, a branch, rib, or string of ore, leading along to the lode. — Leaders, in printing, are a row of dots, employed in tables of contents, indexes, etc., for the guidance of the eye to the end of a line for the termination of the sense.

Lead-Mill, a circular plate of lead, used by the lapidary for roughing or grinding.

Lead-Pencil. See PENCIL.

Leads, shaped pieces of metal used by the compositor for spacing and arranging lines of printing-type.

Lead-Shot. See LEAD.

Lead-Spar, a sulphate of lead.

Leadwort, the common name for several species of plants, belonging to the genus *Plumbago,* which have extremely acrid properties; the roots and leaves are used for raising blisters, and as a stimulating wash for ulcers.

Leaf, the green blade of plants. A large commerce is carried on in many kinds of prepared leaves, as of tea, tobacco, and senna; for forage, as in hay; for culinary purposes, as cabbage; and for fibrous use, as many palms. The term *leaf* is also applied to anything foliated, as the flap of a table, the side of a folding-door, the double page of a book, a thin plate of metal or horn. The leaf of a fan is the surface which is cut in the shape of the segment of a circle.

Leaf-Gold. See GOLD (LEAF).

Leaf-Lard, lard from the flaky animal-fat of the hog.

Leaf-Metal. See DUTCH GOLD-LEAF.

League, a measure of length, used in reckoning distances by sea. The sea-league is three nautical or geographical miles, or the $\frac{1}{20}$ of a degree, and consequently about 3.45 English miles. A league, or three miles, is the limit from shore generally allowed for the jurisdiction of a country to extend in fisheries, etc.; and also the limit of neutral water, in which a fugitive ship is safe.

Leak, a hole or breach in a ship, through which the water comes in.

A ship is said to *spring a leak,* when she begins to leak or let in the water. The manner of stopping a leak is to put into it a plug wrapped in oakum and well tarred, or to insert a tarpaulin clout which keeps out the water, or to nail a piece of sheet-lead on the place. Seamen sometimes stop a leak by thrusting a piece of salt beef into it. The sea-water, being fresher than the brine imbibed by the beef, penetrates into its body and causes it to swell so as to bear strongly against the edges of the broken plank, and thereby stops the influx of the water. A ready way to find a leak in a ship is to apply the narrower part of a speaking-trumpet to the ear and the other to the side of the ship where the leak is supposed to be; then the noise of the water rushing in at the leak will be distinctly heard, and thereby discovered.

Leakage, an allowance made of a certain rate per cent, for the leaking of casks, and the waste of contents caused thereby. Also, an allowance of 2 per cent granted by the U. States customs "on the quantity which shall appear by the gauge to be contained in any cask of liquors subject to duty by the gallon."

Lean-Faced, applied in printing to some kinds of letter-type, with unusually thin face-lines.

Leap, in mining, a sudden turn or shift in the course of a mineral lode.

Lea-Rod, in weaving, one of the rods placed athwart the warp-threads and separating the *leas,* or yarns belonging to the respective *heddles.* — *E. H. Knight.*

Lease, a legal document granted by a *lessor* to a tenant, or *lessee,* hiring lands, tenements, etc., for a term of years. — In weaving, the tie around each band of the warp as arranged by the *heck.*

Leash, a thong of leather, or long line with a slip-noose, by which a falconer holds his hawk, or a courser his dog. — A band wherewith to tie anything.

Leat, an artificial watercourse, or level trench, for the conveyance of water to or from a mill.

Leather [Fr. *cuir;* Ger. *Leder;* It. *cuojo;* Russ. *kosha;* Sp. *cuero*]. The skins of various animals, in their fresh state, are flexible, tough, and elastic, and appear to be admirably adapted to the purposes of clothing; but in drying they become hard and horny, and, on exposure to moisture, putrid. The art of restoring the supple qualities to skins, and rendering them durable, appears to have been discovered at an early period of man's

history; and the word *leather*, from the Saxon *lith, lithe*, or *lither*, indicates the quality of suppleness. *L.* is formed by the chemical union of the *dermis, corium, cutis*, or true skin of an animal, with an astringent vegetable principle known as *tannin*, or *tannic acid*. *L.* may, however, be prepared by impregnating the skin with alum, oil, or grease. In the animal hide or skin, the outer part, which is covered with hair or wool, is called the *epidermis*, or *cuticle*, below which is the *reticulated tissue*, and then, in contact with the flesh, is the *dermis*, or true skin, which is the only part which admits of being tanned. It varies in thickness in different parts; the mane, the back, and the rump being thicker than the belly. — The term *pelt* is applied to all skins before they are converted into leather. Tanned skins, or *L.*, are generally divided into 3 kinds, namely, *hides, kips*, and *skins;* and these

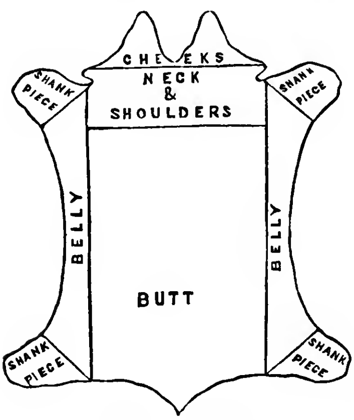

Fig. 309. — Leather.

yield different varieties of *L.*, such as *butts* and *backs*, which are made of the stoutest and heaviest oxhides. When hide is tanned whole for sole *L.*, as seen in Fig. 309, it is called *crop hide*. The same rounded, with the cheeks, shanks, and belly-pieces, etc., pared off, constitutes the *offal;* and *skins* are all the lighter forms of *L.*, such as sheep, goat, deer, etc. Hides are either cowhides or slight oxhides. *Buff-L.*, in the military dress of the Middle Ages, was made of wild-bull hide, and was nearly pistol-proof and sword-proof. Four degrees of thickness are supplied by *bull*-hide, *bullock*-hide, *cow*-hide, and *calf*-hide or calf-skin: the first three of these are mostly employed for harness, and for the soles of boots and shoes, while the fourth is used for upper leathers and for bookbinding. *Sheep*-skin is tanned into a cheap leather, which is used for an immense number of purposes. *Lamb*-skin, thinner and more delicate, has more special applications. *Goat*-skin supplies a better kind of light leather than sheep. *Kid*-skin provides the leather for a large variety of gloves and ladies' boots. *Deer*-skin is dressed with oil to make *shamoy* leather. *Horse*-hide makes good leather for horses' collars. *Seal*-skin is used for the same purpose, and for many others. *Hog*-skin supplies the leather with which saddles are covered. *Dog*-skin leather is made into gloves and other articles. *Antelope, buffalo, rhinoceros, hippopotamus*, and many other sorts of hide are made into special kinds of leather, limited in application.

The most important processes in manufacturing *L.* are described under Tanning, Tawing, and Currying.

Grained Leather, which is curried on the hair or grained side, is called *black on the grain*, and is mostly used for the upper leathers of ladies' shoes. In preparing such leather, the waxing is performed as follows: A solution of sulphate of iron, called *copperas-water*, or *iron-liquor*, is applied to the grain side of the wet skin, when the salt, uniting with the gallic acid of the tan, produces an ink dye; stale urine is then applied to the skin, and when dry the stuffing is applied. The grain is raised, and when dry the skin is whitened, bruised, and again grained; after which a mixture of oil and tallow, applied to the grain side, completes the process.

Enamelled, Japanned, and Patent L. "Japanned *L.*, generally called patent *L.*, was first made in America by Seth Boyden of Newark, N. J., 1818-1820. A smooth, glazed finish was first given to calf-skins in France, which were sold to a considerable extent in the American market; but the manufacture of japanned *L.* has now grown to be a large business in Newark, and the amount of these goods imported is very light. The japanning of calf *L.* for boots and shoes is most successfully conducted by the French. They furnish the best of the highly glazed brilliant material known as patent *L.*, and large quantities were formerly produced in the U. States. Of late the demand for the finer kinds of calf patent *L.* has largely fallen off, and its place is in some measure filled by a cheaper article manufactured mostly of kips or larger hides, split or skived down to proper thickness. It is curried expressly for this purpose, and particular care is taken to keep it as free as possible from grease. The skins are then tacked on frames and coated with a composition of linseed-oil and umber, in the proportion of 18 gallons of the former to 5 oz. of the latter, boiled till nearly solid, and then mixed with spirits of turpentine to the proper consistency; lamp-black is also added when the composition is applied, in order to give color and body. From 3 to 4 coats of this are necessary to form a surface to receive the varnish; they are laid on with a sort of knife or scraper. To render the goods soft and pliant, each coat must be very light, and thoroughly dried between each application. A thin coat is afterward applied of the same composition, of proper consistence to be put on with a brush, and with sufficient lamp black boiled in it to make it a perfect black. When thoroughly dry it is cut down with a scraper having a turned edge, when it is ready to varnish. The principal varnish used is made from linseed-oil and Prussian blue, boiled to the thickness of printer's-ink. It is reduced with spirits of turpentine to a suitable consistence to work with a brush, and is then applied in two or three separate coats, which are scraped and pumiced until the *L.* is perfectly filled and smooth. The finishing coat is put on with especial care in a room kept closed and with the floor wet to prevent dust. The frames are then run into ovens heated to about 175°. In preparing this kind of *L.* the manufacturer must give the skins as high a heat as they can bear, in order to dry the composition upon the surface as rapidly as possible without absorption, and cautiously, so as not to injure the fibre of the *L.* — Enamelled *L.*, now used for carriage-tops, was first manufactured by David Crockett of Newark; previous to this, oil-dressed *L.*, presenting all the appearance of harness *L.*, was used for this purpose. This *L.* is all split by machine, and only large hides are used. By the use of the *L.*-splitting machine, a hide is split in three or four parts, and what in the old process of shaving would have produced but 50 ft of *L.*, is increased to about 125 ft. suitable for glazing, besides a first split that is used for covering trunks. Patent *L.* differs from enamelled *L.* in the fact that the former has a smooth surface, and the latter is finished with less composition, leaving the irregular surface given by the natural grain of the skin where the hair has been removed. In enamelled *L.* American manufacturers take the lead of all others, but they also make much poor stock. The principal cause of complaint against American enamelled *L.* has arisen from the introduction of powerful stretching-machines, by which the size of the hide can be increased from 3 to 7 sq. ft. (The *L.* is sold by measure, not by weight.) The wet *L.* is thrown over a bar which is attached to uprights and can be raised or lowered at will; the edges of the hides are attached to a fixed bar, and by the use of two jack-screws the movable frame is raised until the *L.* is stretched to its utmost. The whole frame is then wheeled into a dry room, where it remains until the *L.* is perfectly dry, after which it passes through the usual process of blacking and varnishing. Hides treated in this way will shrink more rapidly than those stretched in the usual manner; they will even contract if spread out in the wareroom. Smaller hides are now used for this purpose than formerly, as they retain the enamel surface better, owing to their finer grain, and do not shrink so much when exposed to the weather." — *American Cyclopedia*.

Morocco L. is prepared by tanning goat-skins with sumach, and dyeing on the grain side. Inferior moroccos are prepared from sheep-skins similarly treated, for which purpose each skin of pelt is sewed up into a bag, the grain side outermost, distended with air, and placed in a mordant of tin or alum. They are next placed in a warm cochineal bath for red, indigo for blue, orchil for purple, and are worked by hand until the dye has properly struck. For certain colors the tanning precedes the dyeing. The tanning, or sumaching, is carried on in

a large tub, containing a weak solution of sumach in warm water; another and stronger solution is contained in an adjoining vessel, a portion of which, together with some sumach leaves, is poured into the bag; some of the weak solution is then added, and the bag is distended with air, and the skin thrown into the vat. In this way about 50 skins are treated, and are kept in motion a few hours in the sumach-tub by means of paddles worked by hand or by machinery. The skins are then taken out and heaped up on a shelf at the side of the tub, the pressure thus produced causing the liquor to escape slowly through the pores of the skin, the bags being shifted about from time to time. The bags are next passed into a second vat containing a stronger solution, where they remain for 9 hours. The bags are now opened and washed; fine red skins being finished in a bath of saffron. All the skins are next *struck* on a sloping board until they are smooth and flat, and in order to improve their appearance in the currying, a little linseed-oil may be rubbed on the grain side. They are then hung up in a loft to dry, when they become horny, and are *in the crust*, as it is called. They next pass through much laborious friction with the pommel, and with a glass ball; while the peculiar ribbed appearance of morocco is given by means of a ball of box-wood, on which is a number of narrow ridges. Sheep-skin morocco is prepared from split skins; the skin-splitting machine resembles in principle that already described, only as the membrane is thinner certain variations are required. Instead of stretching the skin on a drum, it is passed between two rollers, the lower one of gun-metal, and solid, and the upper made of gun-metal rings; while between the two rollers, and nearly in contact, is the edge of the sharp knife, which is moved by a crank, as already mentioned. When a skin is introduced between the two rollers, it is dragged through against the knife-edge and divided, the solid lower roller supporting the membrane, while the upper one, being capable of moving through a small space by means of its rings, adjusts itself to inequalities in the membrane; where this is thin the rings become depressed, and where it is thick they rise up, so that no part escapes the action of the knife. The divided skins are not sewed up into bags, as from their thinness they can be sumached quickly.

Commerce. The most important kinds of *L.* are comprised under the terms, *sole-L.* and *upper-L.* Morocco and other kinds of tanned skins are included under the general head of *L.* The *L.* industry of the U. States, which is mostly carried on in the Eastern States, is of very great importance, and ranks second in the list, being inferior only in point of capital and labor employed in all its branches to that of agriculture. New York is the greatest market in the world for hemlock sole-*L.*, and our principal port of importation for calf-skins, kids, etc. The leading upper-*L.* market is in Boston, where considerable business is also made in sole-*L.* Philadelphia, Baltimore, and Cincinnati are noted for oak-sole; while the trade in hemlock-*L.* is extensively carried on in Buffalo and Chicago. In Great Britain, the *L.* trade, whose principal market is at Leeds, is inferior only to those of cotton, wool, and iron. The two great producing and exporting countries for sole-*L.* are England and America; while calf-skins and upper leathers are largely imported from continental Europe, chiefly from Paris, where centres all the French calf-skin business. Calf-skins are largely produced in France at Milhau, Lyons, Nantes, Chaumont, and Beauvais; in Germany, at Mentz, Worms, Oppenheim, Offenbach, Dresden, Frankfort, Freiburg, etc.; in Belgium, at Brussels; and in Switzerland, at Lausanne.

Our imports of *L.* of all kinds, for the year 1878, amounted to 5,912,777 lbs., valued at $3,784,729, of which France sent 3,685,030 lbs., valued at $2,461,633; England, 1,164,139 lbs., valued at $653,737; and Germany, 734,016 lbs., valued at $493,218.

Exports of Leather and Manufactures of Leather from the U. States, for the year 1878.

COUNTRIES TO WHICH EXPORTED.	LEATHER, AND MANUFACTURES OF.						
	Boots and shoes.		Leather of all kinds, not elsewhere specified.		Morocco, and other fine.	Saddlery and harness.	Manufactures not elsewhere specified.
	Pairs.	Dollars.	Pounds	Dollars.	Dollars.	Dollars.	Dollars.
Argentine Republic	......	......	....	....	....	747	5,763
Austria	......	......	135,090	28,438	....	....	1,500
Belgium	......	......	1,070,584	291,111	9,957	1,203	8,630
Brazil	10,027	11,816	917	175	....	209	2,986
Central American States	9,821	13,758	1,959	628	37	6,152	1,232
Chili	240	854	....	....	141	788	....
China	20	101	10,886	3,096	....	78	1 065
Denmark	......	......	1,868	512	....	....	....
Danish West Indies	4,752	5,337	16.263	5,103	289	805	2,424
France	......	......	15,014	2,471	....	....	3,849
French West Indies and French Guiana	365	382	268,539	53,865	....	1,680	23
Miquelon, Langley, and St. Pierre Islands	1,092	1,322	9,755	2,190	91	....	....
French Possessions in Africa & adjacent islands.	300	366	....	....	....	....	....
French Possessions, all other	3,143	4,966	551	183	5	949	265
Germany	6,119	8,145	7,179,537	1,638.723	4,581	239	97,297
England	5,540	9,108	18,019,787	3,723,909	793,248	6,123	89,022
Scotland	8,308	15,269	311,825	67,495	1,907	619	32,392
Nova Scotia, N. Brunswick, and P. E. Island	60,605	75,339	24,690	5,253	4,831	4,149	12,649
Quebec, Ontario, Manitoba, and N. W. Ter	19,081	27,190	307,314	78,239	29	9,601	8,582
British Columbia	15,355	27,430	26,795	7,733	....	9,027	6,825
Newfoundland and Labrador	192	344	77,390	15,825	400	....	5,522
British West Indies and British Honduras	59,915	63,750	14,583	3.405	636	3,791	10,423
British Guiana	6,029	3,968	30,909	8,837	1,165	119	2,742
British East Indies	40	52	....	....	....	....	....
Hong-Kong	......	......	955	805	....	....	330
British Possessions in Africa & adjacent islands.	2,709	3,720	5,557	1,288	180	2,140	2,401
British Possessions in Australasia	9,464	15,582	8,697	658	20,882	23,881	14,554
Hawaiian Islands	23,550	38,416	47,038	13,330	198	13,026	5,231
Hayti	13,651	17,840	1,363	300	2,130	1,464	1,558
Italy	......	......	....	....	....	....	489
Japan	345	678	477,320	128,537	3,175	149	2,732
Liberia	2,854	4,264	....	....	....	....	....
Mexico	45,883	60,950	3,755	2,610	1,636	14,406	9,067
Netherlands	130	249	270,455	91,153	49,988	125	39,054
Dutch West Indies and Dutch Guiana	4,074	4,395	21,039	4,592	....	638	1,070
Peru	......	......	....	....	....	959	1,001
Azore, Madeira, and Cape Verde Islands	1,236	2,272	1,633	861	1,004	....	....
Russia, Asiatic	2,606	4,057	2,791	706	....	640	....
San Domingo	8,784	8.952	....	....	93	862	821
Cuba	2,033	3,533	7,526	2,539	1,375	5,430	10,589
Porto Rico	1,133	1,650	97	20	896	3,081	942
Spanish Possessions in Africa & adjacent islands	......	......	1,300	230	....	32	....
Spanish Possessions, all other	410	505	....	....	....	18	....
Sweden and Norway	......	......	8,642	2,013	....	....	15
United States of Colombia	18,810	28,698	10,378	2,955	1,035	6,376	4,602
Uruguay	......	......	....	....	1,540	59	....
Venezuela	1,981	2,284	1,343	204	2,569	7,802	8,927
All other countries	555	894	....	....	....	133	....
Total	351,152	468,433	28,389,140	6,183,052	903,963	127,000	891,574

Leather, Artificial. Under this name come many products which the inventors call *leather cloth, American leather, vegetable leather, imitation leather, panonia leather*, etc. They nearly all consist of some composition laid as a coating upon a woven cloth of flax, wool, or cotton, penetrating more or less completely between the fibres. The materials for the various compositions are very numerous — linseed-oil, lamp-black, turpentine, oak-bark infusion, alum, gelatine, stearine, resin oil, zopissa, solution of tin, india-rubber, leather-parings, naphtha, gutta-percha, etc., — some or other of these combined in various proportions. The simpler of these leather substitutes are much used as a material for cheap bags, table-covers, etc.

Leather-Dresser, a currier; one who prepares leather in various ways.

Leather-Embosser, one who stamps leather in patterns for bookbinding, covering furniture, or room-hangings.

Leather Enameller, or **Japanner**, a varnisher of leather; the workman who gives the glossy surface for which patent leather is remarkable.

Leather-Paper. See PAPER.

Leather-Splitter, a mechanic who divides leather, splitting it into thin sections by a machine-cutting knife.

Leather-Stainer, one who dyes leather.

Leather-Striper, a workman who marks leather with colored lines for the use of shoebinders and others.

Leaven, dough in a state of ferment; yeast.

Lebon, a fermented liquor, or milk-beer, similar to the koumiss made by the Arabs.

Lectern, a reading-stand used in churches to rest the books on during service.

Ledger, the principal book of accounts kept by merchants, banks, and companies, for entering the debit and credit transactions of individuals. See BOOK-KEEPING.

Lee, an epithet used by seamen to distinguish that part of the hemisphere to which the wind is directed from the other part whence it blows, and which is accordingly called *to windward.* This expression is chiefly used when the wind crosses the line of a ship's course, so that all on one side of her is called to windward, and all on the other side to leeward.

Hence, *under the lee* implies farther to the leeward, or farther from that part of the horizon whence the wind blows. *Under the lee of the shore* means a short distance from the shore which lies to windward. This phrase is commonly understood to express the situation of a vessel anchored, or sailing under the weather-shore, where there is always smoother water, and less danger of heavy seas, than at a great distance from it. *Lee lurches*, the sudden and violent rolls which a ship often makes to the leeward in a high sea, particularly when a large wave strikes her on the weather-side. *Lee side*, all that part of a ship or boat that lies between the mast and the side farthest from the direction of the wind; or, otherwise, that part of a ship which is pressed down toward the water by the effort of the sails, as separated from the other half by a line drawn through the middle of her length. That part of the ship which lies to windward of this line is accordingly called the weather side. Thus, admit a ship to be sailing southward with the wind at east, then is her starboard or right side the lee side, and the larboard or left the weather side.

Leeward ship signifies a vessel that falls much to leeward of her course when sailing close-hauled, and consequently loses much ground. *To leeward*, toward that part of the horizon which lies under the lee, or whither the wind blows. Thus, "We saw a fleet under the lee," and "we saw a fleet to leeward," are synonymous expressions.

Leeway, in navigation, is the deviation of the course actually run by a ship from the course steered upon; or it is the angle formed between the line of the ship's keel and the line which she actually describes through the water. In consequence of the action of the wind or currents, a ship is generally impelled *sideways* as well as forward, whence the direction of her motion is different from that of the keel.

Leech, a red-blooded worm of aquatic habits, and provided with a sucker at both ends of the body. There are many species, the greater part of which inhabit fresh water. The common *L.*, *Sanguisuga medicinalis* (Fig. 310), which is usually about the length of the middle finger, bears a considerable resemblance to the earthworm in its general structure, but differs as to the conformation of its mouth and digestive apparatus.

Its skin is composed of from ninety to a hundred or more soft rings, by means of which it acquires its agility, and swims in the water. It has a small head; a black skin, edged with a yellow line on each side, and some yellowish spots on the back; and the belly, which is of a reddish color, is marked with pale yellow spots. But the most remarkable part is the mouth, which is situated in the middle of the cavity of the anterior sucker; and three little cartilaginous bodies, or jaws, are seen to be disposed around it in such a manner that the three edges form three radii of a circle. Each of these has two rows of minute teeth at its edge, so that it resembles a small semicircular saw. It is imbedded at its base in a bed of muscle, by

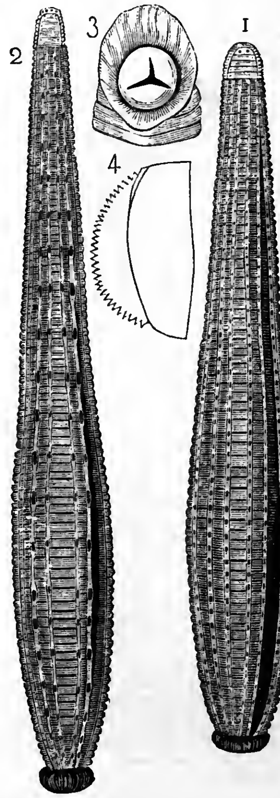

Fig. 310. — 1. COMMON LEECH. 2. HORSE-LEECH.
(3. *Anterior Extremity magnified*; 4. *Jaw detached, magnified.*)

the action of which it is worked in such a manner as to cut into the skin, — a sawing movement being given to each piece separately. It is in this manner that the tri-radiate form of the leech-bite is occasioned; each ray being a separate little saw, this apparatus enables the *L.* to penetrate the skin without causing a dangerous wound. The lacerated character of the wound is very favorable to the flow of blood, which is further promoted by the vacuum created by the action of the sucker. The alimentary canal consists of an œsophagus, a long stomach, with cæcal sacs, and an intestine. The operation of digestion is extremely slow, notwithstanding the rapid and excessive manner in which the *L.* fills its stomach; a single meal of blood will suffice for many months: nay, more than a year will sometimes elapse before the blood has passed through the alimentary canal in the ordinary manner, during all which period so much of the blood as remains undigested in the

stomach continues in a fluid state. This accounts for the reluctance of the *L.*, after being used to abstract blood, to repeat the operation; it not only being gorged at the time, but provided with a sufficient supply for so much longer. Indeed, the true medicinal *L.* does not seem to take any solid aliment, but subsists on the fluids of frogs, fish, etc. *L.* derive their principal interest from the use that is made of them as a remedial agent; but it should be observed that there are only two species so employed, and these are principally derived from the south of France, Sweden, Poland, and Hungary The Swedish *L.* are now generally considered the best. Considerable numbers of *L.* were formerly brought to the U. States from France and England; but blood-letting being now little resorted to by physicians, our imports have much diminished, their value for the year 1878 being only $5,379. The American species *Hirudo decora* (Sav.), especially abundant in Pennsylvania, is extensively used in the Middle States. It is common for the leech-dealers to drive horses and cows into the ponds, that the *L.* may fatten and propagate more abundantly by sucking their blood. Children are also employed to catch them by the hand; and grown persons wade into the shallow waters in the spring of the year, and catch the *L.* that adhere to their naked legs In summer, when they have retired to deeper waters, a sort of raft is constructed of twigs and rushes by which a few are entangled. They are also taken by laying baits of liver, to which the *L.* resort, and are then caught; but this last method is thought to make them sickly. A *L.* may be known to be in good health if it be active in the water, and plump when taken out. — The most certain method of inducing *L.* to bite is to cleanse the skin thoroughly; and they should be exposed to the air for a short time previous to their application, as by this means they will bite more freely. If they are voracious, they may be applied to the part by being held lightly in the fingers, or they may be placed in a leech-glass, which is a preferable mode. — The HORSE-LEECH (*Hæmopis sanguisorba*) is much larger than the medicinal species, but its teeth are comparatively blunt, and it is little of a blood-sucker, — notwithstanding the popular notion, — and useless for medicinal purposes. It feeds greedily on earthworms, which issue from the banks of the ponds or sluggish streams which it inhabits.

Imp. free.

Leech, Artificial, a mechanical contrivance for drawing blood in place of the worm usually employed, consisting of a light glass tube from which the air is expelled by the vapor of ether, and whose mouth is then applied to a previously scarified portion of the body.

Leech-Rope, that part of the bolt-rope at the side of the sails.

Leefance, an iron bar upon which the sheets of fore and aft sails traverse.

Leek, a well-known pot-herb, the *Allium porrum*, used in soups.

Leer, an annealing furnace in a glass-house; a long arched building in which glass articles are placed to assume hardness and temper.

Leeward, Leeway. See LEE.

Leeward Islands, a name frequently applied to those of the West India Islands lying between lat. 15° and 19° N., and lon. 60° 30′ and 65° 40′ W. The group comprises the British possessions of Antigua, Dominica, Montserrat, Nevis, St. Christopher's, Anguilla, Barouda, and the Virgin Islands. The French, Dutch, Danes, etc., have also possessions in the group, which comprises 23 islands, besides numerous islets.

Legal Tender. See TENDER, LEGAL.

Leggins, long gaiters reaching to the knees.

Leghorn, a seaport (see ITALY). — One of the names for a Tuscan plait for bonnets and hats, obtained from the straw of a variety of bearded wheat. See HAT, ITALY (*Manufactures*), STRAW.

Leguminous, pertaining to pulse; plants that produce pods, as pease, beans, etc.

Leipzig. See SAXONY.

Lehigh and Susquehanna R.R. is given in the APPENDIX to this work.

Lehigh Valley R.R. runs from Phillipsburg (Pennsylvania Line), N. J., to Wilkesbarre, Pa., 101 m., with the following branches: Penn Haven to Audenried, 17.71 m.; Hazle Creek Bridge to Tomhicken and branches, 33.78 m.; Lumber Yard to Milnesville and branches, 18.25 m.; Black Creek Junction to Mount Carmel and branches, 59.21 m.; Slatedale Branch, 3.30 m. Total length of branch lines, 132.25 m. This Co., whose offices are in Philadelphia, also owns the Easton and Amboy R.R. in New Jersey (60 m.), by which it has access to the sea at Perth Amboy, and the Buffalo Creek R.R. in New York State. The Pennsylvania and New York R.R. and the Geneva, Ithaca, and Sayre R.R. are operated in the interests of this Co., which also operates under lease 9.60 m. of the Pennsylvania and New York R.R., between Lackawanna Junction and Wilkesbarre. The general account of this Co. in 1878 was as follows: —

Railroad (231.26 miles)	$14,647,080.78
Equipment	8,282,317.11
Total ($99,149.86 per mile)	$22,929,397.89
Real Estate, Stocks, and Bonds	22,784,411.43
Cash Bills receivable, etc	9,380,675.73
Property and Assets	$55,100,485.07
Capital Stock	$27,228,855.00
Funded Debt	24,391,000.00
Unfunded Debt	2,172,000.00
Other Liabilities (cancelled)	752,177.88
Profit and Loss	646,452.19
Liabilities	55,100,485.07

Leith. See GREAT BRITAIN (Seaports).

Lemnian Earth, a pale-red, clayey substance dug in the island of Stalimene (Lemnos), and used both as a paint and as a drug.

Lemon [Fr. *citron, limon*; Ger. *Limone*; It. *limone*; Port. *limõe*; Sp. *limone*], the fruit of a tree of the citron or orange family (*Citrus limonum*), a native of Eastern Asia, from whence it has spread to Southern Europe, the West Indies, Florida, etc. Several varieties are known in commerce. The principal are: the Wax *L.* (*Citrus limonum ceriescum*); this is the smooth-peeled one, most generally found in the markets; its rind is thick. The Bignette *L.* (*Citrus limonum bignetta*) is a thinner-peeled fruit than the wax *L.*, less oval in shape, and more blunt at the point; the color of the rind is less clear, and is usually tinged with green. It is cultivated more largely than any other variety, as it yields a larger quantity of juice, and is a most abundant bearer. The Clustered *L.* (*Citrus limonum racemosum*) is the least oval of the imported *L.*, but the nipple-like point is fully developed. The rind is thick, and has a bright yellow color. The pulp is less agreeable than the varieties previously mentioned. The *L.* produced in Florida is equal to the best European fruit, and it is to be regretted that but little attention is given to its cultivation. *L.* are extensively imported from Palermo, Messina, and Naples, and occasionally from Malaga, in boxes containing each 333 of the average size.

The fruit differs from the orange in containing more citric acid and less sugar. The quantity of the former is very great (see CITRIC ACID), and, being an approved specific in the prevention and cure of scurvy, and a powerful and agreeable antiseptic, as well as an ingredient in many pleasant refrigerant drinks, it forms, in an expressed state, an important article of trade, especially in Italy. Being liable to ferment, it is, when exported in this condition, secured in bottles, and covered with a thin stratum of oil. The *peel*, or outward *rind*, is warm, aromatic, and slightly bitter; it is frequently employed in stomachic tinctures, and for preserves and liqueurs: it also yields an essential oil, which is much used in perfumery, and also by confectioners as a substitute for the fresh peel.

Imp. duty: fresh *L.*, 20 per cent; *L.*-peel (not preserved, candied, or otherwise prepared), free; *L.*-juice, 10 per cent.

Lemon-Grass, a name for the *Andropogon citratum* of Decandolle. From its fragrant smell and pleasant taste, it is in common use in the West

Indies as a substitute for Chinese tea, and is frequently employed as a sudorific in febrile diseases. The white succulent centre or pith of the leaves is used in India to give an agreeable flavor to curries. It is largely cultivated in Ceylon and the Moluccas, and the otto obtained by distillation, and known in commerce as *citronella oil*, is employed for perfuming soaps and grease, and making artificial essence of verbena.

Fig. 311. — LENTIL.

Lenitive-Electuary, an agreeable confection, prescribed as a mild laxative.

Leno, a kind of cotton gauze, used for window-blinds, which is thinner and clearer than buke muslin, and is made bordered and figured for long curtains.

Lenox Fire-Insurance Co., located in New York City, organized in 1853. *Statement*, Jan. 1, 1879: Cap. stock paid up in cash, $150,000; net surplus, $55,004.17. Risks in force, $7,078,644; premiums, $47,100; premiums received since the organization of the Co., $1,405,564.85; losses paid, $754,846.20; cash dividends paid to stockholders, $313,500.

Lens, the name given to a piece of glass, or other transparent medium, which, from the curvature of their surfaces, have the property of causing the luminous rays which traverse them either to converge or diverge. According to their curvature, they are either spherical, cylindrical, elliptical, or parabolic. Those used in optics are always spherical. They are usually made either of *crown-glass*, which is free from lead, or of *flint-glass*, which contains lead, and is more refractive than crown-glass.

Lenses for optical instruments are made of circular pieces of flat glass, ground by means of convex or concave iron tools, with a grinding powder of sand or emery, after which the surfaces are polished with putty powder. The principle is much the same in all cases; but wonderful care is needed in grinding and polishing the larger lenses for telescopes, and the exquisitely small kinds for microscopes. The best *L.* yet produced come from the manufactory of Messrs. Chance of Birmingham, England, and are made by a process whose details have never been made public.

Lentil, a pulse, the *Ervum lens* (Fig. 311), the seed of which are very nutritious, but difficult of digestion. The *L.* is closely allied to the tare, and is probably the most ancient of all the food products which man derives from the pea-tribe. The *red pottage* in Gen. xxv. 34, is the small *L.* decorticated, as it is sold at the present day in the bazaars of India. Three varieties are cultivated in France, where, as in most Roman Catholic countries, this kind of pulse is extensively used during Lent; to which season, as some suppose, it gives its name. The *L.* is a native of Europe and Asia. It is cultivated occasionally in some parts of England as a fodder plant, but it has not found favor among American agriculturists. The ripe seeds are largely imported from France and Germany into this country for culinary purposes, but they are only used by our European population. In Egypt the *L.* forms a large proportion of the general food of the inhabitants, and the haulm is used for packing purposes. The empirical preparation called *Revalenta Arabica* is nothing but the meal of decorticated *L.*, a food by no means well adapted to all constitutions, especially those of infants. The quantity of starch in the *L.* is very considerable; and, in addition to the gluten, renders this pulse one of the most nutritive of vegetable food-products.

Les Saintes. See GUADELOUPE.

Let, to lease; to grant possession and use for a specified compensation.

Letter, a mark or character, written, printed, engraved, or painted, used as the representative of a sound, or of the articulation of the human organs of speech. —A written message or despatch, sent by one person to another, and most usually transmitted by mail through the post-office.

Letter-Box, a post-office box for receiving letters; a box in a street-door for depositing letters.

Letter-Carrier, a post-office distributor; a postman who delivers letters.

Letter-Case, a box for holding letters. — A compositor's case of type.

Letter-Clasp, Letter-Clip, a kind of spring-file, or hold-fast, for letters or papers.

Letter-Copying-Machine Maker, a manufacturer of copying machines.

Letter-Cutter, a die-sinker; a type-cutter; a maker of projecting letters in brass, glass, porcelain, or wood.

Letter-File, a box, case, folio, or envelope for containing letters to which reference is required to be made.

Letter-Founder, a founder who casts printing-type.

Lettering-Tool, a bookbinder's tool for stamping with movable type the gilt titles on the backs of books.

Letter of Advice, a letter giving advice of any transaction. See ADVICE.

Letter of Attorney. See POWER OF ATTORNEY.

Letter of Credit, an open letter of request, whereby one person requests some other person or persons to advance money or to give credit to a third person, named therein (who requires to be identified), for a certain amount, and promises that he will repay the same to the person advancing the same, or accept bills drawn upon himself for the like amount.

It is called a general letter of credit when it is addressed to all merchants, or other persons in general, requesting such advance to a third person, and a special letter of credit when it is addressed to a particular person by name, requesting him to make such advance to a third person. If the letter of credit be of the latter sort, there does not seem to be any doubt that it is an available promise in favor of the person to whom it is addressed, and who makes the advance upon the faith thereof. But if the letter of credit be general, it is a matter of some doubt whether the writer is bound to the person making advance upon the strength of the letter. The question has several times been thoroughly discussed in the Supreme Court of the U. States. The doctrine was maintained in these cases that the letter-writer is bound positively and directly to any party making the advance upon the faith of the letter, not only where the letter purports, on its face, to be addressed generally to any person or persons whatsoever who should make the advance, but also in cases where the letter is addressed solely to the person to whom the advance is to be made, and merely states that the person signing the same will become his surety for a certain amount, without naming any person to whom he will become security, if it is obviously to be used to procure credit from some third person, and the advance is made upon the faith of the letter by such third person. It has been held in the State of New York that letters of credit and commercial guarantees are not negotiable instruments.

Letter of License, an instrument by which creditors allow to a party a specified time to pay his debts, and agree not to molest him in his person or property till after the expiration of such additional time.

Letter of Mark. See PRIVATEER.

Letter of Recommendation, a letter to a third party in which the bearer or party named is represented as entitled to credit, for which the party giving the letter, if acting in good faith, is not responsible, although the party to whom it was addressed may have sustained injury or loss by reason of it. But when the recommendation is knowingly false, the party recommending is liable. — *T. McElrath.*

Letter-Paper, paper of post size, for writing letters on. When laid out flat it is 10 × 16 inches, and 8 × 10 when folded.

Letterpress, print or impression taken from type.

Letterpress Printer, one who uses type in printing, contradistinguished from a copperplate or lithographic printer.

Letters-Patent, a patent right. See PATENT.

Letter-Wood, a very costly wood from Guiana, obtained from *Piratinera guianensis.* It is very hard, of a beautiful brown color, with black spots, which have been compared to hieroglyphics. The spotted part is only the heart-wood, which is seldom more than 12 or 15 inches in circumference. It is adapted for cabinet work of small size, and for veneering only.

Lettuce, a well-known succulent vegetable (*Lactuca sativa*), used as a salad. After its flower-stem shoots, it abounds with a milky juice, possessing soporific powers, and which, in the strong-scented wild lettuce (*L. virosa*), is so abundant that it has been used as a substitute for laudanum and opium.

Levant, a name derived from the Italian word for the south-east, and applied in the Middle Ages to that quarter of the Mediterranean east of Cape Matapan, now generally applied to the coasts of Asia Minor, Syria, etc. *Levant*, in geography, signifies any country to the eastward of us, or in the eastern part of any continent or country, or in that quarter where the sun rises.

Levantine, a stout, close-made, twilled silken fabric, now little used.

Levee, an embankment on the margin of a river to confine it within its natural channel.

The lower part of Louisiana, which has been formed by encroachments upon the sea is subjected to be inundated by the Mississippi and its various branches for a distance of more than 300 miles. In order to protect the rich lands on these rivers, mounds are thrown up of clay, cypress-logs, and green turf, sometimes to the height of 15 feet, with a breadth of 30 feet at the base. These, in the language of that part of the country, are called *levees.* They extend for hundreds of miles; and when the rivers are full, cultivated fields, covered with rich crops, and studded with villages, are seen several feet below the river courses. The giving way of these levees, sometimes occasioned by a sudden and violent pressure of the water, and sometimes by accidental perforations, is called a *crevasse* (Fr., a disruption).

Levee Dues, a commercial charge on shipping, levied at certain landing-places for the repair of levees. In New Orleans the levee dues are 20 cts. per ton on all vessels.

Level, an instrument which shows the direction of a straight line parallel to the plane of the horizon. The plane of the sensible horizon is indicated in two ways: by the direction of the plummet or plumb-line, to which it is perpendicular; and by the surface of a fluid at rest. Accordingly, levels are formed either by means of the plumb-line, or by the agency of a fluid applied in some particular manner. They all depend upon the same principle, namely, the action of terrestrial gravity.

L. in which the plumb-line forms the essential part are those most usually employed for the common purposes required by bricklayers, masons, carpenters, etc. They are constructed under many different forms; but the general principle is as follows: A frame or board is prepared, having one edge perfectly straight, and a straight line is drawn on the frame at right angles to the straight edge. To some point of this straight line a thread carrying a plummet is attached; consequently, when the frame is placed in such a position that the thread of the plummet, hanging freely, coincides with the straight line, the straight edge of the frame, which is perpendicular to it, must be horizontal. — *Spirit Level*, by far the most convenient and also the most accurate level, consists of a closed glass tube, very slightly curved on the upper side. It is filled with spirit, with the exception of a bubble of air which tends to rise to the highest part of the tube. It is set in a case, and when it is placed on a perfectly level surface, the bubble is exactly in the middle of the tube. — A gallery in a coal-mine, named in fathoms according to its depth below the surface.

Levelling, removing the inequalities of the surface for roads, railroads, etc.

Levelling Instruments, the spirit-level, theodolite, staves, and other instruments used by the surveyor.

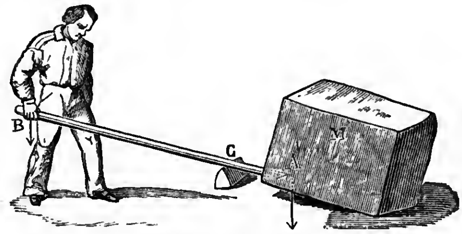

Fig. 312. — LEVER.

Lever, the most simple and common, but at the same time most important of the seven mechanical powers, consisting of an inflexible right line, rod, or beam, movable about a fulcrum or prop, and used for the raising of weights, being either without weight itself, or at least having such a weight as may be conveniently counterbalanced.

The *L.* is the first of the mechanical powers, and on account of its simplicity was the first that was attempted to be explained. Its properties are treated of by Aristotle, and also by Archimedes. When a workman (Fig. 312) wishes to raise a large stone, M, he places an iron bar, A B, under it, with a block, C, under the bar near the stone, and then presses down upon the other end of the bar. The bar constitutes a *L.* The mass to be raised is called the *weight.* The block, or

moving force, is called the *fulcrum*. The parts between the fulcrum and the points where the power or weight acts are the *arms* of the *L.* There are 3 kinds of *L.*: that with the fulcrum between the weight and power; that with the weight between the fulcrum and power; and that with the power between the fulcrum and the weight. In the *L.* of the first kind, if the fulcrum is just half-way between the weight and power, then the weight and power will move through equal distances. In this case the weight and power must be equal in order to balance each other, or to be in equilibrium. If the power were twice as far from the fulcrum as the weight, then the weight would move through only half the distance that the power does, and in this case the power need be only half the weight in order to balance it. Thus we see that, in the case of the lever, the weight and power will balance each other when the power, multiplied by the distance through which it moves, equals the weight multiplied by the distance through which it moves; that is, if the fulcrum of a lever be so placed that one end of the lever will move through a thousand inches, while the other end moves one inch, then a power of one pound on the former will balance a weight of a thousand pounds on the latter.

Levigation, the process of rubbing down or pounding minerals into a paste with water. Camphor, for instance, is easily reduced to powder by levigation with a few drops of alcohol; whereas, if it is pounded in the dry state, great difficulty is experienced in reducing it.

Lewis, a mechanical appliance for raising stone; thin wedges of iron indented into the stone forming a dove-tail. — A kind of shears used in cropping woollen cloth.

Ley, a detergent wash composed of urine, soap, etc., for freeing wool from the animal grease. — A standard of metal.

Leyden Jar, a jar or phial used in electrical experiments, by means of which the electric fluid can be accumulated and preserved in large quantities. Its interior is either coated with tin-foil or filled with leaves of copper, or with gold leaf.

Li, another name for the Chinese copper cash, ten of which make a candareen, 100 a mas, and 1,000 a tael worth about $1.25.

Liabilities, all debts and pecuniary obligations of a merchant.

Lias, a division of the hank of cambric yarn spun by hand; a hank of 30 to the pound contains 360 lias. — Hydraulic lime used for making cement.

Libbra-Grossa, the Italian name for the avoirdupois pound used in the Grecian islands and other localities; *libbra sottile* being the troy pound.

Liberia, a republican State on the W. coast of Africa, between lat. 4° 20′ and 7° 20′ N. The constitution of *L.* is on the model of that of the U. States. The executive is vested in a president and a non-active vice-president, and the legislative power is exercised by a congress of two houses, called the Senate and the House of Representatives. The president is assisted in his executive function by 4 ministers, the Secretary of State, the Secretary of the Treasury, the Attorney-General, and the Postmaster-General. For political and judicial purposes, the republic is divided into 4 states, or counties, which are subdivided into townships. The states are called Montserrado, Grand Bassa, Sinoe, and Maryland. Monrovia, capital of the State and seat of the government, is situated at the mouth of the river Mesurado, near the foot of the Cape Mesurado, and has an estimated population of 13,000. The establishment of the republic of *L.* was virtually an attempt, made by the American Colonization Society, to show the capacity of the negro race for self-government; but as such it is admitted to be a failure. Prevailing disorder, with absence of all progress and civilization, mark the character of the negro republic in its most recent history. The total population is estimated to number 720,000, all of the African race, and of which number 19,000 are Americo-Liberians, and the remaining 701,000 are aboriginal inhabitants.

The settlement of *L.*, founded in 1822, was, on August 24, 1847, proclaimed a free and independent State, as the Republic of *L.* The state was first acknowledged by England, afterwards by France, Belgium, Prussia, Brazil, Denmark, and Portugal, and, in 1861, by the U. States. The republic has about 600 m. of coast-line, and extends back 100 m. on an average, but with the probability of vast extension into the interior. Provisionally, the river Shebar, near the S. boundary of the British colony of Sierra Leone, has been adopted as N. W., and the San Pedro as S. E. frontier. It was the chief aim of the founders of the republic to purchase the line of seacoast, so as to connect the different settlements under one government, and to exclude the slave-trade, which formerly was most extensively carried on at Cape Mesurado, Tradetown, Little Bassa, Digby, New Sesters, Gallinas, and other places at present within the republic. The coast is generally low, but the country gradually rises toward the interior, and at about 20 or 30 m. from the sea the hills are of considerable elevation. Several rivers fall into the Atlantic within the republic, — as the St. John, St. Paul, and Mesurado; but they are navigable only by small vessels for short distances. The soil is fruitful. The climate both on the coast and in the interior is deadly to the white man, and though less fatal is still formidable to the black man born and reared in temperate regions. Rice, cotton, coffee, sugar, indigo, bananas, yams, and cassava are raised; and camwood, palm-oil, ivory, hides, wax, and pepper are among the exports. Rich metallic deposits are said to exist, but as yet the industry of the inhabitants has been directed almost exclusively to trade and commerce, they having built and manned 30 coast-traders, besides a number of large vessels engaged in commerce with Great Britain and the U. States. A steamer every 6 days connects the W. coast of Africa with Liverpool, England.

The commercial intercourse with the U. States is unimportant. For the year 1878 the exports to this country, consisting of dye-woods and drugs, summed $80,153; and the value of imports from the U. States, consisting of pork and other provisions, was $104,192.

The public revenue in the years 1875–1877 was estimated to have amounted annually to $85,000 in paper currency, and the expenditure to $120,000. The principal part of the revenue is derived from customs duties, while the expenditure embraces chiefly the cost of the general administration. — In August, 1871, the republic laid the foundation of a public debt by contracting a loan of $500,000 at 7 per cent. interest, to be redeemed in 15 years. The loan was issued in England; no interest has ever been paid on it, the government of the republic being actually bankrupt.

Money, Weights, and Measures. The money chiefly used is that of Great Britain, but accounts are kept generally in American dollars and cents. There is a large paper currency. In the traffic with natives on the W. coast of Africa, gold is bought and sold by *Usanos*, each of 16 *Akis*. A Usano of gold is reckoned equal in value to 16,000 "Cowries." It contains 314.76 English troy grains, or 20.396 Grammes. — Weights and measures are mostly British. In the trade with the interior of Africa, the *Ardeb* is the chief measure of capacity for dry goods. The *Gondar Ardeb* contains 10 Madegas, or 120 Uckieh, or 1,440 Dirhems, and is equal to about 7.7473 British imperial pints. The *Massuah Ardeb* contains 24 Madegas, and is equal to 2.3242 British imperial gallons. The *Kuba* is the chief liquid measure; it is equal to 1.7887 British imperial pint.

Libra [L., a pound], a name for a pound weight; also a money of account, varying in different countries. — The best kind of tobacco grown in the western part of Cuba, selected for its good color, flavor, elasticity, and the entireness of the leaves.

Librarian, the custodian of a public or private library. — The owner of a circulating library who lets out books on hire to subscribers.

Library, a collection of books belonging to a private person, community, public institution, or joint-stock company; also the repository of such a collection.

Libretto, the words of an opera.

License, an official grant of permission. Licenses are required in this country for prosecuting various trades and professions, as banking, pawn and all other brokers, distilling spirits, beer-brewing, dealing in wine, spirits, beer, cider, wholesale and retail dealers in general merchandise, apothecaries, peddlers, etc. See LICENSE in the Appendix.

License of Vessels. See COASTING-TRADE.

Lichees, the dried fruit of a Chinese tree, *Nephelium lichi*, occasionally imported into this country in chests of about a picul in weight.

Lichens, cryptogamous plants, many of which enter into commerce, some as articles of food, others as medicinal plants, and many for the valuable coloring matter or pigments obtained from them. All the lichens contain definite crystalline substances which become colored on exposure to a moist warm atmosphere containing ammonia. Tropical lichens are especially rich in these matters, and are largely imported into Europe for the purpose of making the well-known lilac-blue, violet, and purple dyes known as *archil, cudbear*, and *litmus*.

Lid, a cover; that which closes the opening of a box, vessel, etc.

Liebfrauenmilch. See GERMANY (WINES OF).

Lien, or **Retention**, a right which the law gives to individuals in certain situations, to retain property of another which may be in their custody, until certain claims of the custodier against the proprietor be satisfied. To constitute lien, the possession must have been legally obtained for the purpose out of which the claim of lien arises, and must not be the result of force, fraud, or accident. The possession must be actual, either through the creditor or one of his agents. Liens are of two kinds, *special* and *general*. The former is the simple retention of the property, which has been the subject of some contract, implying payment on the one side and delivery on the other, — the delivery being delayed until the payment is made. Persons bestowing labor or skill in improving the value of any movable, have generally a lien over it; as, a miller, a shipwright, a tailor, a dyer, a bleacher, — each on the commodity passing through his hands. Carriers and ship-owners have a lien for the property they convey; but there is none for dead freight or demurrage, unless it be stipulated for. There appears to be no lien on a passenger or the clothes he wears, though there may be on his luggage. Hotel keepers, being under an obligation to receive guests, are said to be provided by the law with this efficacious remedy as a counterpart of their obligation. A special lien is easily created by the usage of trade, and may at any time be stipulated as an article in a contract.

General Lien is of a more complicated description, being the right to retain for a general balance arising in the course of a series of transactions. An express contract, or a contract to be clearly implied from the previous dealings of the parties, or a distinct course of commercial usage, is required to constitute such a lien. It would appear that the usage of a *district* may have the effect of at least excluding a species of lien, acknowledged by the law to hold good in places where it is practised. A law-agent or attorney has a general lien on the papers of his client coming into his hands in the proper course of his business. Calico-printers, dyers, and wharfingers have a general lien in their respective trades. A factor has a general lien on the goods in his possession, for the general balance on the whole of the charges he is entitled to in the course of his factorage. If he shall have become security for his principal with his consent, and has been compelled to pay the sum, it is part of the balance on which he has a lien. In this, as in all other cases, the lien may be defeated by the property being deposited with the factor for a specific purpose, for which he is bound to hold it if he take possession of it, — as, where goods were placed in his hands in consequence of an agreement that they were to be sold for the benefit of a particular creditor. A general lien is held by packers, when they are of the nature of factors, and by insurance-brokers. There is a general lien in favor of bankers, — on bills deposited with them for a general account, but not on those deposited for a specific purpose, or on deeds casually left in their offices, after a refusal to advance money on them. Persons in the situation of being entitled to a lien lose it by relinquishing possession of the property from which they derive it. A factor in a foreign country, however, who has purchased goods for his principal on his own credit, is entitled to stop them *in transitu* after shipment to him; and where the creditor deposits the subject with a third person, apprising him of the lien, and appointing him to keep possession as his servant, the lien is not parted with.

It has been decided that no shipwright has a lien upon a vessel for the repairs, etc., done to the vessel, when he parts with the possession of the vessel, and can only recover the same from the owners in an action for debt, as he in this case, as well as tradesmen, who have no lien upon the ship, are supposed to have given the credit for the requisites required for the vessel to the owner. In maritime lien, the persons who have a claim in the Admiralty Court in *rem*, and can compel reimbursement, consist of those who have rendered services to the ship by their labor, as mariners, by pilotage, tonnage, salvage, and by the loan of money as bottomry for repairs. The wages of seamen have the first claim upon a vessel, and then come salvage, pilotage, tonnage, or bottomry.

Lif, Lief, Loof, a name for the fibre by which the petioles of the date palm are bound together. All sorts of cordage are made of it, and it serves for a rubber or drying towel after the bath.

Life-Annuity, a pension receivable during life. See ANNUITY.

Life-Belt. See LIFE-PRESERVER.

Life-Boat, a boat constructed to float in a stormy sea, many of which are kept at certain parts of the coast to proceed to the assistance of vessels in distress.

A life-boat ought to possess these two qualities in a special degree, — a resistance to overturning, and a readiness to right itself without sinking if overturned. Many patents for life-boats have been applied for in the U. States, but nothing has been produced to rival the excellent life-boat used by the National Life-Boat Institute of England, which, with slight modifications suggested by the special wants of the various localities, is gradually superseding, in our life-saving stations, the American surf-boat of cedar. It has a water-tight deck between the bottom and the rowers' seats; air-tight buoyancy chambers along each side, just above the deck; a bottom nearly flat; a mass of cork and light hard wood between the bottom and the deck; a heavy iron keel to correct the lightness of the superstructure; a bend upwards from the centre of the keel towards each end, to facilitate righting after an overturn; a covered receptacle to contain sails and tackle when out of use; relieving tubes to convey away any water which may be shipped; and a small hand-pump to expedite the clearing when necessary. This life-boat is usually about 30 feet long and 8 feet broad; it costs, with equipment, about $2,000.

Life-Buoy, an apparatus carried on shipboard, piers, etc., for the purpose of throwing to a person who has fallen into the water, to enable him to sustain himself until the arrival of assistance. The commonest form is a zone of about thirty-one inches in diameter, six inches wide, and four inches thick. It is formed of about twelve pounds of cork in thin layers, the whole being held together

by a painted canvas case. Such a buoy will sustain six persons. Some life-buoys comprise a short mast to carry a flag, for daylight, or a composition, which at night burns for some minutes with a powerful light. The object of this arrangement is to attract the attention of the drowning person.

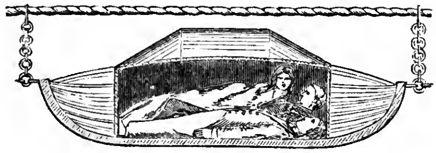

Fig. 313. — Life-Car.

Life-Car, a kind of covered, metallic, water-tight boat, large enough to contain 4 grown persons or 8 small children (Fig. 313), used on the coast of the U. States for transporting persons from a wreck to the shore, by means of a line carried over the wreck by projectiles thrown from a small piece of ordnance, or by rockets designed for the purpose.

Directions for using the Apparatus. When the rope (which should be pliant and well stretched) is brought on the beach or cliff opposite to the stranded vessel, the most even spot, and free from projecting stones, should be selected to lay it on, and great care be taken that no two parts of it whatever overlay or even touch each other; nor must it be laid in longer lengths than of two yards. But to project a small line or cord, it will be necessary, it it is required to contract the faker to half a yard at most, to avoid the jerk received at the end of each right line. The best method, with such a description of cord, is to lay it on the ground in the most short and irregular windings, to relieve it from the powerful impulse. To prove the effect of the impulse on a rope, if it is faked in lengths of 10 or 15 yards, it will break each time, as it then becomes a most powerful pendulum. These precautions are absolutely necessary to the success of the service. — As, however, this method of laying the rope occupies time to place it with the care necessary, and as it frequently happens that a vessel very soon after grounding is going to pieces, and all hands perish, the best method is to bring the

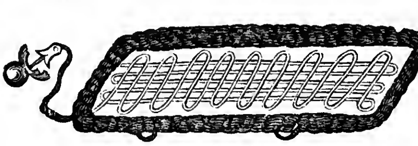

Fig. 314. — Rope in Basket.

rope in a basket (Fig 314), ready to be fired as it arrives at the spot. In this case, the rope should be most carefully laid in alternate tiers or fakes, no part of it overlaying; and it should be well secured down, that in travelling it be not displaced; but, above all, no mistake must happen in *placing the basket properly.* For example, that the end of the basket, from which the shot hangs in the above figure, should be previously marked, and must be placed toward the sea or wreck, that the rope be delivered freely, and without any chance of entanglement. It will be scarcely necessary to add, there will be several tiers of the rope when laid. The utmost care and attention are required in laying the rope in tiers with strict regularity, to prevent entanglement. An éprouvette mortar of 5½ inch calibre is used in the U. States life-saving stations, throwing an iron ball of 20 lbs. weight, to which the line (one inch in circumference) is attached by a spiral wire to take up the jerk. If the wind is sideways to the shore, the mortar must be pointed sufficiently to windward to allow for the slack of the rope lighting on the object, as the rope will, of course, be considerably borne to leeward by the effect of a strong wind, and by its being laid at a low elevation insures the rope falling against the weathermost part of the rigging. While this service is performing, great care should be taken to keep the mortar dry; nor should it be loaded until everything is ready; when that is done, it should be primed; but as it would be impossible to do it with loose powder in a storm, a tube is constructed in the simplest manner of common writing-paper (the outer edge being cemented with a little gum). It is filled with meal gunpowder made into paste with spirit of wine; when in a state of drying, run a needle through the centre, and take care the hole is left open, for, on the tube being inflamed, a stream of fire darts through the aperture with such force as to perforate the cartridge. The mortar should then instantly be fired; and in order to lessen a difficulty that has often occurred in performing this service, a pistol may be used, having a tin box over the lock, to exclude the effect of wind or rain on the priming; and the muzzle being cut (obliquely), dilates the inflammation, so as to require but little exactness in the direction of the aim. — While communication is gaining, 3 stakes should be driven into the ground in a triangular position, so as to meet close at the heads to support each other. As soon as communication has been effected by the crew of the vessel, and they have secured the line attached to the shot, made fast to these stakes, the crew will haul on board by it a large rope and a tailed block, through which a smaller rope is to be rove, both ends of which (the smaller rope) are to be kept on shore. When they have secured these on board, and the larger rope is rove through the rollers, let a gun-tackle purchase be lashed to it, then lash the purchase to the stakes. By the means of the purchase the larger rope may be kept at a fit degree of tension; for, if care be taken to slacken the purchase as the ship rolls out to sea, the danger of the rope being broken will be guarded against; and on the other hand, if the purchase be gathered in as the ship rolls toward the shore, the slackness of the rope, which would prevent the cot (Fig. 314) traversing as it ought to do, and plunge it in the water more than it otherwise would, will be avoided.

Life-Insurance, a contract for payment of a certain sum, or of an annuity, in the event of the death of a particular person, in consideration of a *premium* paid at once, or periodically. *I.* are said to be *absolute* when the sum assured is payable on the death of the party assured; *contingent*, when the payment of this sum depends upon some other event, as the existence or antecedent death of some other person or persons. They may be also divided into *temporary I.*, where the sum is payable only in the event of the expiration of the life *within* a certain limited time; *deferred*, where it is payable in the event of the termination of the life *after* a certain time; and *I.* for the *whole life*, payable on the expiration of the life assured, at whatever time this may happen. *I.* are also effected on joint-lives, under various contingencies; but the greater number are those made on policies for the whole period of a single life, in consideration of an equal annual premium. — Life-*I.* may be made subservient to many purposes. Of these, the principal is enabling persons dependent on their own personal exertions, or whose income ceases at their death, to secure a provision for their surviving dependants; but it is also highly useful to various commercial and legal transactions. The life-*I.* system encourages all to the moral obligation of exercising forethought and prudence, since through its means these virtues may be successfully practised and their ultimate reward secured. These are benefits which it confers upon the individual. But the system is likewise highly beneficial to society at large, inasmuch as while the annual premiums are considered as a part of expenditure, they and the accruing interest on them are in truth so much added to the productive capital of the community. — The insurers are generally public companies, which are divided into three classes: 1. The *proprietary, or joint-stock companies*, with a paid-up capital, which assure to a person paying a fixed premium a fixed sum at his death, and divide their profits entirely among their shareholders. This system, therefore, is merely the sale of an *I.* to those who are disposed to purchase, at such prices as shall leave a profit to the proprietors. 2. The second class consist of *mutual I.* companies, which have no proprietary, but divide all their profits among the insured, after deducting the expenses of management, and reserving a guarantee fund. The mode of calculating profits, however, and the proportion reserved for a guarantee fund, appear to differ among them. 3. The third class, called *mixed mutual and proprietary companies*, generally divide their profits in a certain proportion between a body of proprietors and the parties insured at stated periods. The share of the insured is, by many of the companies

of this class, as well as of class 2d, either added to the policy, or applied in reducing the annual premiums, in the option of the party. — The selection of a company is sometimes a matter of considerable experience; and can seldom indeed be fitly made by persons not conversant with life-*I.* business. The mutual *I.* and proprietary systems have each their advocates. On behalf of the first, it is chiefly argued that the insured have the benefit of all the profit realized; while the proprietary companies state that their arrangement has the advantage of simplicity, that the realization of profit by the insured under the former system is uncertain, and that it entails upon them the responsibility of partners for the losses of the company.* Each kind, however, has its advantages, according to the objects of the party wishing to be assured. For family purposes, and especially where the party is young, the mutual associations are generally preferred; while for temporary or "short *I.*," and those connected with many kinds of trust and money transactions, a liberal proprietary company is commonly chosen; the mixed associations hold out the advantages of both methods. A proprietary company making no returns will be selected on a joint consideration of its respectability, rate of premium, and of the conditions annexed to its policy. In the case of a mixed office sharing profits, regard will besides be paid to the amount of their returns or *bonus*. In a mutual society, the rate of premium is by some deemed of minor importance, as the surplus is divided wholly among the insured, and the office may in so far be regarded as his savings-bank; but rates greatly in excess lead to a needless amplitude of funds, — a condition not very favorable to economical management. — The first company to win success in the U. States started business in 1843. Since then, chiefly since 1858, and notwithstanding some failures, the life-*I.* business has been prudently and very successfully conducted by most of our American companies. The following statistics of the companies belonging to, or authorized to act in, the State of New York, for the year 1878, may give an idea of the actual magnitude of life-*I.* business in this country: —

Number of companies........................	34
Number of policies in force....................	612,843
Amount insured..............................	1,480,921,223
Gross assets.................................	404,079,144
Gross liabilities except capital................	339,585,626
Surplus as regards policy holders..............	64,493,518

Each of the above companies has a special article at its alphabetical order in this work, or in the Appendix at the end of the book. See also ANNUITY AND INSURANCE.

"All calculations in life-*I.* are based upon two simple data: the rate of interest on the invested assets of the companies, and the average rate of mortality among the insured. Both of these are variable quantities; the rate of interest varies in different States (see INTEREST) according to the statute laws and the general demand for money; the rate of mortality varies in different countries and in successive generations, owing to the habits of living, progress in medical science, and the general intelligence of the people, all of which exert a great influence on the average duration of human life. And yet, with all this uncertainty in the fundamental data, life-*I.* companies can do strict mathematical justice to the insured. This is accomplished by assuming certain fixed and invariable standards of interest and mortality; the former taken so as to come within the lowest average rate, and the latter taken as nearly as possible to the actual experience of companies, and then returning to the insurer the surplus which remains after the future liabilities on the policies and the present expenses of the business are provided for. The *rate of mortality* is a basis for life-*I.* calculations much more difficult to determine than the rate of interest. To persons of ordinary observation there is nothing so uncertain or unforeseen as death, occurring as it does at all ages, and resulting from an infinite variety of causes. The tables of mortality in common use have been computed after a long and careful observation, and it has been found that in a large number of people of any given age there is a certain annual ratio of deaths to the number of the living, and that this ratio increases or decreases from year to year with a remarkable regularity. Among a class of a few hundred persons we are predicted, with a reasonable certainty, that some will die within a year. In a class of one hundred thousand persons living at a certain age we can predict, with a great deal of accuracy, how many of them will die each successive year until none of them survive. Numerous tables of mortality have been made, both in this country and in Europe, based upon actual observation and the records of *I.* companies, and the rate of mortality in the corresponding ages agrees with great uniformity. The 'Actuaries, or Combined Experience Table of Mortality,' has many claims to popularity, being compiled from the mortuary experience of 17 English life-*I.* companies; and it has this advantage, which is possessed by no other table which preceded it, — all the data were derived from selected lives, and for this reason it more accurately represents the experience of our life-*I.* companies. This table (given below) has been adopted by the State of Massachusetts, and by many of the companies in the U. States, as a basis upon which premium rates are calculated, valuation of policies made, and dividends declared. The 'American Experience' table of mortality, prepared by Mr. Sheppard Homans, Actuary of the Mutual Life of New York, from the mortuary records of that company, and graduated by comparing it with the 'Combined Experience' table, has been adopted, with 4½ per cent interest, as the standard of valuation in the *I.* departments of New York, Missouri, and Michigan, and many companies have made it the basis of their premium rates. The observations made in different countries during the past two or three centuries on the mortality of persons at different ages have established the fact that there is a certain law or scale to which the average duration of human life conforms. For all practical purposes in life-*I.*, it may be regarded as certain that all life will terminate within a century after birth, but the time when any individual life will end is wholly a matter of uncertainty. It is this contingency, that death may happen, which makes life-*I.* desirable, and as this contingency increases after the days of childhood are passed, the more hazardous and expensive the risk becomes. In fire-*I.* the ratio of buildings in any class of risks which will burn during a year can be calculated with considerable accuracy, and the whole number insured are taxed to pay the claims which arise from those which are consumed. The annual rates of premium in fire-*I.* are graded according to the hazard of the risk, and in life-*I.* the same general principles are adopted. Thus at the age of ten in the 'Actuaries' Table of Mortality,' we have a class of 100,000 lives; at the end of the first year 676 are assumed to have died, leaving 99,324 survivors. If these 100,000 persons have insured each other for one year in the sum of \$1,000 each, the uniform premium required (without regarding expenses and interest) would have been $\frac{676 \times \$1,000}{100,000}$ or \$6.76. At the age of twenty there are 93,268 living, and 680 deaths at the end of the year. The premium in this example would be $\frac{680 \times \$1,000}{93,268} = \$7.29$. At the age of seventy the premium has increased to

$$\frac{2,327 \times \$1,000}{35,827} = \$64.93.$$

This illustration of the net *cost of I.*, as applied to temporary policies for only one year is probably the simplest and the most elementary one which can be given. In practice, however, it is modified by the assumed rate of interest on the invested assets of the company and the kind of policy issued." (*Cost of Insurance, by Nathan Willey, Actuary.*)

RATE OF MORTALITY.

According to the "Actuaries'," or "Combined Experience" Table.

Complete age.	Numbers surviving at each age.	Deaths in each year.	Chances out of 1,000 of dying in one year.	Natural premium to insure \$1,000 for one year.
10........	100,000	676	6.76	\$6.50
11........	99,324	674	6.79	6.53
12........	98,650	672	6.81	6.55
13........	97,978	671	6.85	6.59

* Every desirable security may be obtained on the mutual principle. The proprietary and mixed companies offer, it is true, the guaranty of a subscribed or paid-up capital in addition to the premiums, but it has long been proved that, with proper tables and a fair amount of business at starting, this capital is unnecessary. The only advantage of capital to a company seems to lie in its enabling the directors justifiably to seek for investments on secondary securities, at a high rate of interest; investments which a mutual society must avoid, and which even other companies, especially those on the mixed plan, should shun until a sum sufficient (with future premiums) to meet all claims is set apart in the best securities which the state of society offers.

Rate of Mortality. *Continued.*

Complete age.	Numbers surviving at each age.	Deaths in each year.	Chances out of 1,000 of dying in one year.	Natural premium to insure $1,000 for one year.
14........	97,307	671	6.90	$6.63
15	96,636	671	6.94	6.68
16........	95,965	672	7.00	6.73
17	95,293	673	7.06	6.79
18........	94,620	675	7.13	6.86
19........	93,945	677	7.21	6 93
20........	93,268	680	7.29	7.01
21........	92,588	683	7.38	7.09
22........	91,905	686	7.46	7 18
23........	91,219	690	7 56	7.27
24........	90,529	694	7.67	7.37
25........	89,835	698	7 77	7.47
26........	89,137	703	7.89	7.58
27........	88,434	708	8.01	7.70
28........	87,726	714	8.14	7.83
29........	87,012	720	8.28	7.96
30........	86,292	727	8.42	8 10
31........	85,565	734	8.58	8.25
32........	84,831	742	8.75	8 41
33........	84,089	750	8.92	8 58
34........	83,339	758	9.10	8.75
35........	82,581	767	9 29	8.93
36	81,814	776	9.48	9.12
37........	81,038	785	9.69	9 31
38	80,253	795	9.91	9.53
39........	79,458	805	10.13	9.74
40........	78,653	815	10.36	9.96
41........	77,838	826	10.61	10 20
42........	77,012	839	10.89	10.48
43........	76,173	857	11.25	10.82
44........	75,316	881	11.70	11.25
45........	74,435	909	12.21	11.74
46........	73,526	944	12.84	12.35
47........	72,582	981	13 52	13 00
48........	71,601	1,021	14.26	13.71
49	70,580	1,063	15.06	14.48
50........	69,517	1,108	15.94	15.33
51........	68,409	1,156	16.90	16.25
52........	67,253	1,207	17.95	17.26
53........	66,046	1,261	19.09	18.36
54........	64,785	1,316	20.31	19.53
55........	63,469	1,375	21.66	20.83
56........	62,094	1,436	23.13	22.24
57.... ...	60,658	1,497	24.68	23.73
58........	59,161	1,561	26 39	25.37
59	57,600	1,627	28.25	27.16
60........	55,973	1,698	30.34	29.17
61........	54,275	1,770	32.61	31.36
62........	52,505	1,844	35.12	33.77
63........	50,661	1,917	37.84	36.38
64........	48,744	1,990	40.83	39.26
65........	46,754	2,061	44.08	42.39
66........	44,693	2,128	47.61	45.78
67........	42,565	2,191	51.47	49.49
68........	40,374	2,246	55.63	53.49
69........	38,128	2,291	60.09	57.78
70........	35,837	2,327	64 93	62.44
71........	33,510	2,351	70.16	67.46
72........	31,159	2,362	75.80	72.89
73	28,797	2,358	81.88	78.73
74	26,439	2,339	88.47	85.07
75........	24,100	2,303	95.56	91.89
76........	21,797	2,249	103.18	99.21
77........	19,548	2,179	111.47	107.18
78........	17,369	2,092	120.44	115.81
79........	15,277	1,987	130.06	125.06
80........	13,290	1,866	140.41	135.01
81........	11,424	1,730	151.44	145.61
82........	9,694	1,582	163.19	156.92
83........	8,112	1,427	175.91	169.15
84........	6,685	1,268	189 68	182.38
85........	5,417	1,111	205.10	197.21
86........	4,306	958	222.48	213.92
87........	3,348	811	241.23	232.92
88........	2,537	673	265 27	255.07
89........	1,864	545	292 38	281.14
90........	1,319	427	323.73	311.28
91........	892	322	360.99	347.10
92........	570	231	405 26	389.68
93........	339	155	457.23	439.64
94........	184	95	516.30	496.45
95........	89	52	584.27	561.80
96.... ...	37	24	648.65	623.70
97	13	9	692.31	665.68
98........	4	3	750.00	721.15
99........	1	1	1,000.00	961.54

The following, extracted from the tables of one of the oldest mutual companies of America, shows the premiums required to secure $1,000 payable at the death of the insured, with share in the profits of the company: —

Age.	Annual Payments.	One Payment.	5 Annual Payments.	10 Annual Payments.	15 Annual Payments.
	$	$	$	$	$
21	17.52	282.22	69.44	39 25	29.94
22	17.97	287.52	70 78	40 00	30.54
23	18.43	293.00	72.16	40.78	31.16
24	18.92	298.65	73 58	41.59	31.80
25	19.43	304.50	75.05	42.43	32.47
26	19 97	310 54	76 58	43 29	33 15
27	20 54	316 80	78.15	44.19	33 87
28	21 13	323.25	79.79	45.12	34 61
29	21.75	329.90	81 47	46 08	35.38
30	22.40	336.80	83.22	47.07	36.18
31	23 09	343.88	85.02	48.10	37.01
32	23.81	351.22	86.89	49.16	37 87
33	24.57	358.90	88.82	50.26	38.76
34	25.38	366.60	90.82	51.40	39.69
35	26.22	374.66	92.88	52.58	40.66
36	27.12	383.00	95 02	53.80	41.67
37	28.06	391.60	97.23	55.06	42.72
38	29.06	400.47	99.52	56.38	43.82
39	30.13	409.65	101.89	57.74	44.97
40	31.25	419.14	104.35	59.17	46.18
41	32.45	428.96	106.91	60.66	47.46
42	33 73	439.10	109.56	62.22	48.80
43	35 09	449.58	112.33	63.85	50.21
44	36.54	460.36	115.21	65 55	51.70
45	38 08	471.44	118.18	67.32	53.27
46	39.71	482.75	121.25	69.16	54 91
47	41.43	494.30	124.40	71.06	56 61
48	43.25	506.02	127.65	73.03	58.40
49	45.18	517.97	130.98	75.07	60.27
50	47.22	530.10	134.40	77.18	62 23
51	49.39	542.42	137.91	79.36	64.28
52	51.68	554 90	141.51	81.62	66.43
53	54.12	567.55	145.20	83.97	68 69
54	56.69	580.33	148.98	86.40	71.07
55	59.43	593.24	152.88	88.93	73.58
56	62.34	606.28	156.88	91.56	76.24
57	65.43	619.40	160.98	94 30	79.04
58	68.73	632.65	165.21	97.18	82.02
59	72.24	645.99	169 55	100.19	85.18
60	75.97	659.37	174.05	103 35	88.55
61	80.26	672.80	....	....	....
62	84.83	686.20	....	....	....
63	89 71	699.60	....	....	....
64	94.93	712.93	....	....	....
65	100.50	726.20	....	....	....

Endowment Policies. Endowment *I.* is commonly defined as the union of *I.* with endowment in the same policy. If the endowment is of the same amount as the *I.*, as is almost invariably the fact, and for the same term, then the whole policy may be, and commonly is, regarded as the union of a simple term *I.* with a pure endowment for the same term. If the life contingency, or risk of death, is considered as a positive quantity in the former, it is a negative quantity in the latter. This means that if the company loses by the death during the term in the former case, it gains by it in the latter. According to this commonly accepted definition, this very useful policy, which provides for one's dependants in case of his own death, and for his own old age in case of his survival, is analyzed into two, both of which are affected by the law of mortality in contrary senses. The more you analyze in this way, the more people not well versed in algebra are mystified; for no other language than algebra has power to deal satisfactorily with positive and negative quantities in the same calculation. By a different analysis the negative quantities will all disappear. If, instead of regarding the policy as composed of the *I.* of a given invariable amount for a term of years, united with an endowment of the same amount at the end of the term in case of survival, we regard it as the *I.* of a decreasing series of sums, united to an increasing accumulation, the amount of which latter at any period of the term, added to the sum then insured, shall equal the face of the policy, we shall have precisely the same thing as before, with the contingency, so far as the company is concerned, all on one side The "endowment" in a technical sense is annihilated We have in its stead a mere series of savings-bank deposits, subject to certain peculiar conditions, or, in other words, a series of self-*I.*, supplementary to the series of yearly *I.* done by the company. Without affecting the practical results at all, we have got a new point of view from which the whole matter is as plain as *I.* for a single year.

The following, also taken from the tables of the mutual company above referred to, shows the annual premiums re-

quired to secure $1,000 at the time specified, or at death, if prior, with share in the profits of the company: —

Age.	At the end of 10 Years.	At the end of 15 Years.	At the end of 20 Years.	At the end of 25 Years.	At the end of 30 Years.
	$	$	$	$	$
21	102.69	64.79	46.45	35.93	29.34
22	102.80	64.92	46.59	36.09	29.52
23	102.92	65.06	46.74	36.26	29.72
24	103.05	65.20	46.90	36.44	29.93
25	103.19	65.35	47.07	36.63	30.16
26	103.34	65.52	47.25	36.84	30.40
27	103.48	65.68	47.44	37.06	30.67
28	103.65	65.86	47.64	37.30	30.95
29	103.81	66.05	47.85	37.55	31.27
30	103.99	66.24	48.09	37.83	31.59
31	104.18	66.46	48.33	38.13	31.96
32	104.36	66.68	48.60	38.45	32.35
33	104.58	66.92	48.89	38.84	32.77
34	104.80	67.17	49.20	39.19	33.24
35	105.02	67.44	49.54	39.61	33.74
36	105.26	67.74	49.91	40.06	34.29
37	105.52	68.07	50.32	40.56	34.89
38	105.81	68.43	50.76	41.11	35.54
39	106.13	68.84	51.27	41.71	36.27
40	106.46	69.28	51.81	42.37	37.05
41	106.85	69.77	52.41	43.09	....
42	107.31	70.32	53.09	43.89	....
43	107.80	70.93	53.82	44.79	....
44	108.36	71.63	54.65	45.76	....
45	108.97	72.36	55.54	46.83	....
46	109.65	73.18	56.52	....	....
47	110.38	74.07	57.59	....	....
48	111.17	75.03	58.74	....	....
49	112.02	76.07	59.99	....	....
50	112.95	77.20	61.35	....	....
51	113.97	78.43	....	....	....
52	115.04	79.76	....	....	....
53	116.22	81.22	....	....	....
54	117.50	82.80	....	....	....
55	118.89	84.52	....	....	....
56	120.41	....	....	....	....
57	122.05	....	....	....	....
58	123.90	....	....	....	....
59	125.80	....	....	....	....
60	128.00	....	....	....	....

Mode of Effecting Life-I. The company delivers to the party proposing an *I.* a printed form, which, where the *I.* is on his own life, he fills up with his name and designation, the place and date of his birth, the sum to be insured, and the duration of the *I.*, along with various particulars regarding his health, viz.: whether he has resided abroad, has had small-pox or cow-pox, been affected with palsy, apoplexy, fits, convulsions, spitting of blood, consumption; or has been subject to gout, insanity, rupture, or to any other disease tending to shorten life. This is followed by a certificate or *declaration*, warranting the truth of these particulars, and declaring them to form the basis of the contract. Where the *I.* is intended to be on another life than that of the proposer, the same particulars are furnished, and warranted, with a further declaration that the proposer has an *interest* in the life of the other to the full amount to be assured thereon. In both cases, references are besides given to two friends of the party on whom the *I.* is made. One of these must generally be the party's usual medical attendant, from whom a very minute declaration is sometimes required, not only on the above particulars regarding the party's health, but also as to his predisposition to disease, and his habits as to activity and temperance. When this is completed, the party whose life is to be insured generally makes his appearance before a committee of the directors of the company, or their medical officer, by whom further inquiries are made; and the result is entered in the company's books accordingly. The declaration, certificates, and other papers are then laid before the board: and from these documents, and frequently information derived from other sources, their decision is formed, and communicated to the applicant. On payment of the premium a receipt is given, containing the number of the policy, which is then made out agreeably to the declaration, inspected by the board, signed by a certain number of directors, and delivered to the party interested. The *time* allowed for the payment of the periodical premium varies in different companies from 15 days to 3 months after the date it is due; but in most companies the forfeiture of the policy may be prevented by paying a fine of so much per cent on the sum insured, within a further limited time, and giving a warranty that the individual is in good health. The consideration for an ordinary *I.* is, as already noticed, generally paid in equal annual premiums; but many other plans are held out to suit the convenience of the insured. Thus, it may be paid — in half-yearly or quarterly instalments — according to ascending or descending scales of premiums, or by premiums payable during a limited number of years.

Extra Risks are always the subject of special agreement. In this class are comprehended lives above 60; persons going beyond the limits of the U. States; all persons in the U. States, S. of 32° N. lat., and within 50 m. of the sea-coast S. of 34° N. lat.; and persons whose lives are, on the ground of health, or from the nature of their employment, not insurable at the common rates of premium

The *Assignation of the Policy* is sanctioned by law; and it may form a security for sums advanced, or become an object of sale. The holder of the policy in these cases pays the future premiums, and his advantage consists in possessing a policy at a less premium than he must have paid at the present age of the party on whose life the *I.* was effected. As the probability of life is continually diminishing, the value of the policy will obviously depend upon the length of time it has endured. Thus, if a policy of $1,000, originally granted on a life of 25, is exposed to sale when the party attains the age of 60, the purchaser will, according to the above given table, have to pay only $19.43 annually during the existence of the policy; whereas, if he had taken out one at the present age of the party, his premium would be $75.97; and for the excess of the latter above the former, namely, $56.54, a price is fixed. The value of a policy may also depend upon the future annual contributions being paid under a guarantee by the assigner, or from a fund set apart by him; or upon the premium having been paid in a gross sum when the policy was opened. In general, however, it may be observed that a policy must be most valuable to the party assured himself, and less so to others, according to their convenience of paying the premiums, and obtaining proper information respecting the party in whose life they are interested. On this account, and perhaps for the still weightier reason that all who sink capital to be drawn back upon a contingency, stipulate for a much higher than common return of interest (independent of the chances of life), policies are sold at very disproportionate prices. Most assurance companies are willing to treat for a renunciation of the policy; but where it has been opened for family purposes, and the assured's circumstances become reduced, an endeavor is frequently made, particularly where the policy has endured for a considerable time, to retain it among his friends.

Policies may be obtained in the name of a wife, or made payable to her for her sole use and benefit, and, in case of her death before her husband, to her children. These are free from the claims of creditors of the husband, and can only be assigned by the parties in interest with his consent and approval. — Creditors may insure their debtors for their own benefit, to the amount of their indebtedness, with an allowance for the interest that may accrue; but should the policy exceed this amount, with the premiums added, the excess will belong to the estate of the insured. — A business firm may insure the lives of its members to protect it against loss from the sudden withdrawal, on the death of one of its members, of capital, skill, or business ability.

On the Expiration of the Life Assured the company requires production of certain documents, — such as the certificate of the burial of the deceased, and references to the medical persons and others who attended him in his last illness; and, if he opened the policy himself, the probate of his will, or, if it has been assigned, a copy of the assignment. The time when the sum insured is paid varies in different companies; but is commonly within 2 months after proof of the death. In this interval due investigation is made; and everything having been found satisfactory, the claimant brings with him the policy, and a receipt for the sum, which is immediately paid to him. Where a claim is payable in the event of a person being alive at a certain time, his appearance before the directors, or a person appointed by them, is requisite, or sufficient proof must be given that he was alive at the time defined by the policy.

Warranty and representation are of great importance in life *I.* It is usual for the party to sign a specific declaration regarding his age, health, and habits; and if this be part of the policy, its contents are of the nature of warranties. The warranty that the person "is in good health at the time of making the policy" does not infer perfect freedom from disorder. The question is, whether the life is "a good one," which it is if there be nothing that positively reduces the chance of the individual living as long as the average of other people. A person slightly diseased, namely, by occasional rheumatism, may die of an increase of the disorder; but the chances of his doing so are scarcely more than that a man in perfectly sound health may, within the same time, fall a victim to a deadly disease. If there be a fixed consumption, however, or disease of the heart, the seeds of death are planted, — the subject is clearly a damaged one, and though it may hold out for some time, the chances are against it, and it is far from being worth the same sum with an undamaged commodity. It is the practice to require some specific answers to certain questions as to the party's health, namely, if he has had the small-pox, or has been inoculated? if he has had the gout? if he is ruptured? and, undoubtedly, false answers to such questions will vitiate the contract. It is the practice to follow up with the question whether there be any disease tending to shorten life. And the answer

must be given on the above principles. Where the *I.* company demands no warranty or special information, it takes the risk of the life being a good one, subject to the exception of fraud. There may always be fraud in the concealment of material facts. It is held that the person insuring is not to be the judge of what is material, and that it will not avail him to prove that he did not think the circumstance material, and, on that account, did not communicate it; so that, whenever there is anything in the position of the insured, whether as to health or habits, which distinguishes him from the generality of men, it is not safe to omit stating it. If the person has been seriously ill recently before the *I.* is effected, that circumstance ought to be mentioned, and reference should be made to the physician who attended him. A certificate is generally required from the usual medical attendant, and if, instead of the physician who has been recently attending, one who attended at a distant period only is adduced, the policy will be vitiated.

Fig 315. — LIFE-BELT.

Life-Lines, ropes carried along yards, booms, etc., or any part of a vessel, for men to hold on by.

Life-Preserver, any device for rendering the human body buoyant in the water.

The weight of the human body is a little less than that of an equal bulk of water, so that it naturally floats in that liquid. When, however, a man floats on his back on the water, his mouth will most probably sink under the surface, unless he use some strong muscular effort, so as to throw the head back. It is a well-known fact, that many persons unable to swim, who fall into still water, might be saved, if they retained their presence of mind, so as to preserve a proper position. By attaching to the chest some buoyant substance, it becomes an easy matter to keep the upper part of the body above the surface of the water. The arrangements for effecting this purpose are not large in bulk, and are generally known by the name of life-preservers. They are principally made of cork, in the form of jackets and belts (Fig. 315), or of india-rubber cloth belts or cylinders, which, when inflated, are able to sustain a person above the surface of the water. By the law of the U. States, steamboats are required to carry a certain number of life-preservers, proportionate to their passenger capacity.

Lift, a hoist; an elevator; a dumb-waiter. — A lifting-machine. — A support or tackle running from the yard-arms to the mast-head. — The difference in level between the upper and lower pounds in a lock. — A substitute for canal-locks, the boats being raised and lowered by machinery from level to level. — The rise of an undershot-wheel above the surface of the water.

Lifter, a contrivance for hoisting goods; an elevator. — In a steam-engine, the arm on a lifting-rod that lifts the puppet-valve. — A tool used by founders for dressing the mould. — A domestic tool for raising or adjusting the lids of a stove; also an implement for holding hot plates or dishes. — In paper-making, a cast-iron wheel with buckets revolving in a case, lifting pulp from the pulp-chest, and passing it to the trough.

Lift-Gate, a movable gate removed by lifting.

Lift-Hammer, a light form of tilt-hammer, which is raised by a spring and depressed by a treadle.

Lifting-Bridge, a swing or draw bridge over a dock, moat, or canal.

Lifting-Jack, a simple mechanical arrangement for raising one end of the axle-tree of a carriage, and so lifting the wheel from the ground; the wheel can then be removed, or turned round for the purpose of being cleaned.

Lifting-Machine, an exercising machine, of which there are many forms, used in the gymnasium for a person to try and gradually improve his strength.

Ligan, Lagan, goods cast into the sea, from a ship in stress of weather, and sunk, but having a float or buoy attached by a line, in order that they may be subsequently found and recovered.

Ligature, in printing, two or more letters cast on one piece or shank. They are also called *logotypes* (*wood types*). The ligatures now in use are few in number, having been reduced to æ, œ, ff, ffi, ffl, fi, and fl; but within the last forty years we had also the ct, ſb, ſh, ſi, ſk, ſl, and ſt, now discarded mainly in consequence of our confining ourselves entirely to the short *s*. The & is the modern form of the *&*, the *e* and *t* joined together for *et*. — In surgery, any tight-fitting string or cord.

Light (Electrical). When the current produced by a battery of a dozen or more cells (see GALVANIC BATTERY) is conveyed by a wire, if the wire is thin enough, the heat may be sufficiently great to heat the wire to redness. By stretching a piece of platinum wire between two separate rods which convey the current, as represented in Fig. 316, the length of wire through which the current passes may be adjusted so as to give any required amount of light, and the wire may even be heated to the fusing-point of platinum. This property of electricity has some interesting applications, as, for example, in firing mines and other explosive charges, and in some surgical operations. A still more interesting exhibition of heating and luminous effects is observed when the terminals of a battery of many cells are connected with two rods

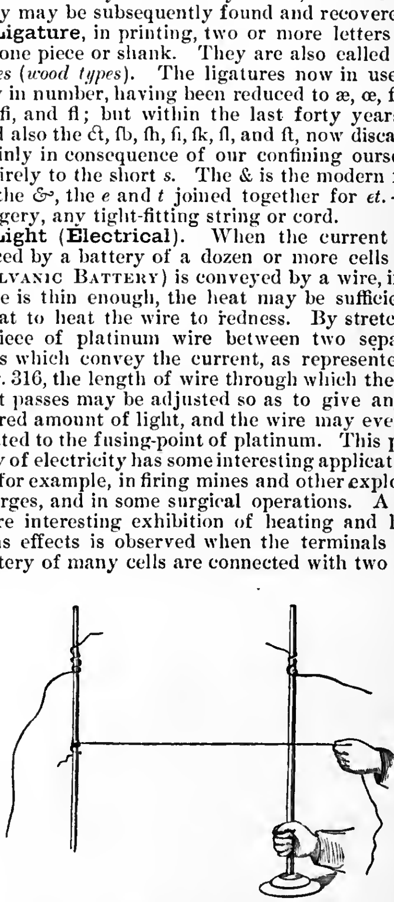

Fig. 316. — WIRE IGNITED BY ELECTRICITY.

of coke, or gas-retort carbon. When the pointed ends of the rods are brought into contact, the current passes, and the points begin to glow with an intensely bright light, and if they are then separated from each other by an interval of $\frac{1}{10}$ of an inch or more, according to the power of the battery, a luminous arc extends between them, emitting so intense a light that the unprotected eye can hardly support it. This luminous arc is called the *voltaic arc*, and it excels all other artificial lights in brilliancy, a fact due to the extremely high tem-

perature to which the carbon particles are heated, the temperature being, perhaps, the highest we can attain. It must not be supposed that in this brilliant light we see electricity: the light is due to the same cause as the light of a candle or gas flame, namely, incandescent particles of solid carbon. These particles are carried from one carbon point to the other, and it is found that the positive pole rapidly loses its substance, which is partly deposited on the negative pole. But in order to obtain a steady light, it is requisite to keep the pieces of carbon at one invariable distance; and therefore the transference of the material from one pole to the other, and the loss by combustion, must be compensated by a slow movement of the carbons towards each other. Several kinds of apparatus are used for this purpose, but they all depend upon the principle of regulating the motions by the action of an electro-magnet, formed by the current itself, which becomes weaker as the carbons are farther apart. The movement is communicated to the apparatus by clock-work.

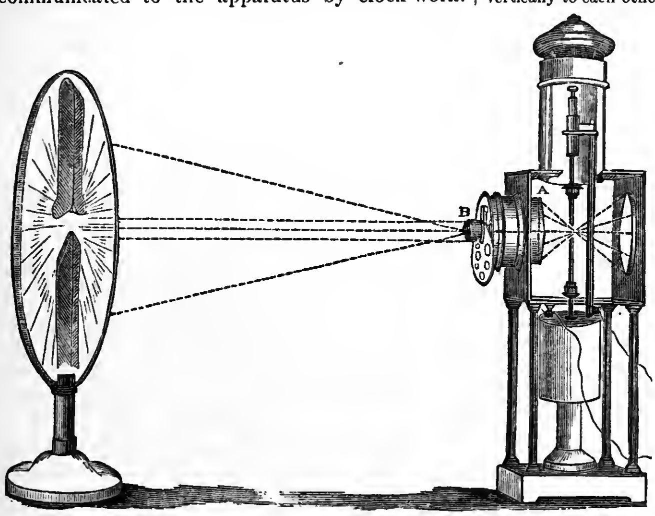

Fig. 317. — Duboscq's Electric Lantern and Regulator.

Duboscq's electric lantern is shown in Fig. 317, with enlarged images of the carbon points projected on a screen. The mechanism of the regulator is contained within the cylindrical box immediately below the lantern. The supports of both carbons are moved; that which bears the positive carbon pole being advanced twice as fast as the other, and thus the light is maintained at the same level, for the positive carbon wears away twice as fast as the other. The light is more brilliant when charcoal is used instead of coke, but then it is necessary to operate in a vacuum, to avoid the combustion of the charcoal. The electric light has recently been applied to illuminate light-houses, steamers, large manufactories, and for other purposes, and will soon be more widely employed if the discoveries announced by Mr. Edison and others satisfactorily answer the two following great desideranda in electric light: 1. To produce a pure, steady, and reliable light; 2. to produce it so cheaply that it can compete with gas for general and domestic illumination. In the following lines is given, after a short notice on the improvements in electric light up to this day, an account of Mr. Edison's latest experiments, as stated by himself.

The voltaic-arc system began to attract the attention of inventors as early as 1840. Probably its first use outside the laboratory and class-room was in the year 1845, when it was employed at the opera in Paris to produce the effects of the rising sun. Its success was so satisfactory that before long enterprising managers had extended its field of usefulness by means of lenses and prisms to the production of luminous fountains, artificial rainbows, and lightning. At this period, however, facilities for obtaining steadiness and uniformity of the light were exceedingly crude, and some mechanical device to keep the carbons at the same relative distance from each other was indispensable. The first contrivance or regulator, as it was called, for this purpose was made in 1845 by Wright, of London, and consisted of disks of carbon having their circumference cut to a V shape and receiving motion from well-known mechanism. The following year Staite and Edwards, in London, patented several regulators, the principle underlying them being the enclosing of the carbons in small cases, which made the carbon points meet obliquely. In 1848, Foucault, in France, and Petrie, in England, made further improvements by which the adjustment of the carbons was made quite reliable. Then followed numerous others, extending to the present time, of more or less perfection. Among them may be mentioned Archereau's, Lacasagne's, Thiers's, Serrin's, Duboscq's, Farmer's, Brush's, Maxim's, and Fuller's. In the year 1876 a new departure in the form of regulators was made by M. Jablochkoff, a Russian engineer, who, instead of placing the carbon rods vertically to each other, placed them side by side, with a thin insulating substance between them. In this form the voltaic arc, playing between the extremities of the carbons, gradually consumed them downward, as a flame consumes a candle. Indeed, so analogous was the invention to a candle, that it soon became known as the *Jablochkoff candle*, — a name it still bears. The *incandescent method* of electric lighting was first successfully shown by King in 1845. He placed a rod of carbon in a globe of glass from which the air had been extracted, and passing a current of electricity through the rod caused it to become heated to such a degree that one could read large print a considerable distance away by the light emitted. His labors, however, were productive of no practical results, and while his theory for producing light was regarded as a pretty one, few were so bold as to predict that it would ever develop into an economical and efficient method of illuminstion. The following year Greene and Staite filed a patent for a lamp analogous to that of King, pointing out that they freed the carbon before use from impurities by treating it with nitro-muriatic acid. In 1849, Petrie obtained patents for the same purpose, concerning which he wrote as follows: "A light may be produced by passing an electric current through a short and thin conductor, which heats and becomes luminous; but the majority of substances fuse and burn rapidly. However, I obtain a good light by using iridium or one of its alloys. Iridium may be fused so as to produce an ingot while it is submitted to the heat of the voltaic arc; afterward it may be decarbonized and rendered more malleable. It can be cut into small pieces, that can be fixed upon two insulated metallic supports which are in connection with the two wires of a battery. Then there is produced a beautiful light." From this time until 1873 electric lighting by incandescence made but little progress, inventors regarding the incandescent method as much inferior to that of the voltaic arc. In the latter year, however, interest in the incandescent method was a little revived by an invention of M. Lodyguine, who made a lamp that overcame many of the difficulties previously deemed insurmountable. Concerning this invention the report to the Imperial Observatory of Paris said: "The sole inconvenience of the use of carbon instead of platinum consists in the fact that in the combustion the carbon combines with the oxygen of the air and is thus gradually consumed. M. Lodyguine has avoided this inconvenience by enclosing the carbon heated to whiteness by the electric current in a glass vacuum hermetically sealed, and from the interior of which the oxygen is expelled by a most simple process." But improved as was this arrangement over those that had gone before, practice demonstrated that there were still many serious difficulties it did not meet. Among other things carbons presented obscure spots indicative of non-homogeneity; minute cracks also occurred in the carbon and rapidly disintegrated the same. The vacuum likewise was very imperfect, and there was produced within the glass globe a kind of evaporation that tended slowly to destroy the carbon rods. This evaporation also left a pulverized deposit of sublimated carbon on the inside of the glass globe.

Within the past few years various English and American inventors have overcome many of these difficulties, but there still remained enough to render incandescent electric lighting impracticable. While inventors were busy both on the voltaic-arc and incandescent methods, progress was far from slow on the means for producing or generating the electric current. At an early day it was evident to experimenters that to produce either the voltaic arc or incandescence with any degree of economy a different method of generating the electricity than that afforded by the chemical batteries in use was necessary. An important discovery by Ampère in 1820, developed almost simultaneously by Oersted and Arago and later by Faraday, to the effect that powerful currents of electricity could be produced by the rotation of magnets near each other, opened an opportune field for purposes of electric lighting. Pixii, a manufacturer of physical instruments in Paris, in 1832, was the first practically to apply the discovery. He constructed a machine consisting of an electro-magnet and a permanent magnet, with mechanism for revolving one directly in front of the other, which revolution induced strong currents of electricity that could be carried off by wires and made to give light. The invention of Pixii was followed by improvements by Niaudet, Holmes, Ladd, Wilde, and Siemens, and in late years by Gramme, Fuller, Brush, Maxim, and others. The invention of Gramme, owned and used extensively in this country for the voltaic-arc system by the Fuller Electrical Company, involved several important new principles that gave a marked impetus to the system and made possible the production of torrents of electricity at comparatively small cost.

After a score of experiments performed in his celebrated laboratory at Menlo Park, near New York, during the year 1879, Mr. Edison claims to have made a discovery which, if it resists practical test, would materially change the system of incandescent lighting and give a rapid stride toward a perfect electric lamp. Sitting one night in his laboratory reflecting on some of the unfinished details, he began abstractedly rolling between his fingers a piece of compressed lamp-black mixed with tar for use in his telephone. For several minutes his thoughts continued far away, his fingers in the mean time mechanically rolling out the little piece of tarred lamp-black until it had become a slender filament. Happening to glance at it the idea occurred to him that it might give good result as a burner if made incandescent. A few minutes later the experiment was tried, and, to the inventor's gratification, satisfactory, although not surprising results were obtained. Further experiments were made, with altered forms and composition of the substance, each experiment demonstrating that at last the inventor was upon the right track. A spool of cotton thread lay on the table in the laboratory. The inventor cut off a small piece, put it in a groove between two clamps of iron, and placed the latter in the furnace. The satisfactory light obtained from the tarred lamp-black had convinced him that filaments of carbon of a texture not previously used in electric lighting were the hidden agents to make a thorough success of incandescent lighting, and it was with this view that he sought to test the carbon remains of a cotton thread. At the expiration of an hour, he removed the iron mould containing the thread from the furnace and took out the delicate carbon framework of the thread, — all that was left of it after its fiery ordeal. This slender filament he placed in a globe and connected it with the wires leading to the machine generating the electric current. Then, extracting the air from the globe and turning on the electricity, a beautiful light greeted his eyes. He turned on more current, expecting the fragile filament instantly to fuse; but the only change was a more brilliant light. He turned on more current, and still more, but the delicate thread remained entire. Then, with characteristic impetuosity, and wondering and marvelling at the strength of the little filament, he turned on the full power of his machine and eagerly watched the consequence. For a minute or more the tender thread seemed to struggle with the intense heat passing through it — heat that would melt the diamond itself — then at last it succumbed, and all was darkness. The powerful current had broken it in twain, but not before it had emitted a light of several gas-jets. Eagerly the inventor hastened to examine under the microscope this curious filament, apparently so delicate, but in reality much more infusible than platinum, so long considered one of the most infusible of metals. The microscope showed the surface of the filament to be highly polished and its parts interwoven with each other. It was also noticed that the filament had obtained a remarkable degree of hardness compared with its fragile character before it was subjected to the action of the current. Night and day the inventor kept up his experiments, and from carbonizing pieces of thread he went to splinters of wood, straw, paper, and many other substances never before used for that purpose. The results of his experiments showed that the substance best adapted for carbonization and the giving out of incandescent light was paper preferably thick like card-board, but giving good results even when very thin. The beautiful character of the illumination and the steadiness, reliability, and non-fusibility of the carbon filament were not the only elements incident to the new discovery. There was a further element, — not the less necessary because of its being hidden, — the element of a proper and uniform resistance to the passage of the electric current. The inventor's efforts to obtain this element had been by far the most laborious of any in the history of his work from the time he undertook the task, and without it absolute success to electric incandescent illumination could not be predicated, even though all the other necessary properties were present in the fullest degree. Passing over the scores of experiments made since the discovery that the carbon framework of a little piece of paper or thread was the best substance possible for incandescent lighting, we come to consider the way in which the same is prepared at the present time in the laboratory. With a suitable punch there is cut from a piece of Bristol cardboard a strip of the same in the form of a miniature horse-shoe, about two inches in length and one eighth of an inch in width. A number of these strips are laid flatwise in a wrought iron mould about the size of the hand and separated from each other by tissue-paper. The mould is then covered and placed in an oven, where it is gradually raised to a temperature of about six hundred degrees Fahrenheit. This allows the volatile portions of the paper to pass away. The mould is then placed in a furnace and heated almost to a white heat, and then removed and allowed to cool gradually. On opening the mould the charred remains of the little horse-shoe cardboard are found. It must be taken out with the greatest care, else it will fall to pieces After

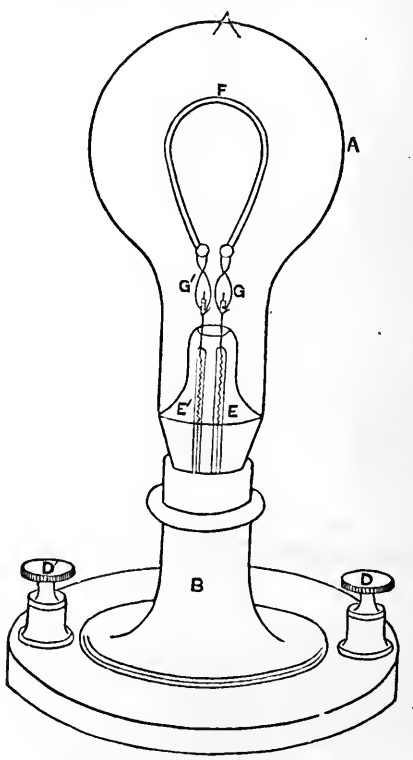

Fig. 318. — Edison's Electric Lamp.

being removed from the mould it is placed in a little globe and attached to the wires leading to the generating machine. The globe is then connected with an air-pump, and the latter is at once set to work extracting the air. After the air has been extracted the globe is sealed, and the lamp is ready for use. Fig. 318 shows the lamp complete: —

A is a glass globe, from which the air has been abstracted, resting on a stand, B. F is the little carbon filament connected by fine platinum wire, G G′, to the wires, E E′, leading to the screw posts, D D′, and thence to the generating machine. The current, entering at D, passes up the wire E to the platinum clamp, G: thence through the carbon filament F to G′, down the wire E′ to the screw post D′; thence to the generating machine. It will be noticed, by reference to the illustration, that it has no complex regulating apparatus, Mr. Edison having realized that regulators were not at all necessary. He thinks that the electricity can be regulated with entire reliability at the central station, just as the pressure of gas is now regulated. By his system of connecting the wires the extinguishment of certain of the burners affects the others no more than the extinguishment of the same number of gas-burners

affects those drawing the supply from the same mains. The simplicity of the completed lamp seems certainly to have arrived at the highest point, and Mr. Edison asserts that it is scarcely possible to simplify it more. The entire cost of constructing it is not more than 25 cts. The lamp shown in Fig. 318 is a table lamp. For chandeliers it would consist of only the vacuum globe and the carbon filament attached to the chandelier and connected to the wires leading to the generating machine in a central station, perhaps a half-mile away, the wires being run through the gas-pipes, so that in reality the only change necessary to turn a gas-jet into an electric lamp is to run the wires through the gas-pipes, take off the jet, and screw the electric lamp in the latter's place. Although the plans have not been fully consummated for general illumination, the outlines of the probable system to be adopted is the locating of a central station in large cities in such a manner that each station will supply an area of about one third of a mile. In each station there will be, it is contemplated, one or two engines of immense power, which will drive several generating machines, each generating machine supplying about fifty lamps. One of the chief difficulties the inventor has had to contend against has been the want of a proper generator for his peculiar method. In the course of his experiments with the light he has used several, and constructed two or three of his own, but none of them have come up to his requirements. The one giving the best satisfaction thus far is the Gramme machine; but even that does not develop electricity with sufficient economy to satisfy him, although from that machine he has obtained six lights per horse-power. He continues confident that in a short time he will have succeeded in constructing a generator that will give much better results. But even with the Gramme, imperfect in many respects for incandescent lighting as it is, he claims to manufacture the light at a cost of a trifle over one cent per hour for six electric lights. His mechanics are now constructing a new generator, which promises to yield much better results, so far as economy is concerned. Mr. Edison asserts that gas must be made and stored in the gasometer at 15½ cts. for each 1,000 feet to compete with his system, and with a possibility of a further reduction by improvement. In one of Edison's electric burners, said to be equal to sixteen candles, there is consumed 2,560 foot-pounds per minute, whereas a gas-jet of equal power consumes 48,000 foot-pounds, or eighteen times more energy to produce the same effect as is produced by the electric light. To put it in more popular terms, the present estimates as to the expense of electric lighting under Edison's system, as made by him, figure the cost of electricity, as compared with gas, at less than one half, or, supposing gas to be furnished at the rate of $2.25 per 1,000 feet, an equal supply of electric light can be furnished for $1, leaving at that price a fair profit for the company supplying the electricity. The figures put forward by the gas companies Mr. Edison claims are based on error. Those who make them do not, he says, understand his system, and he further claims that in many instances they estimate 24 hours per day as the daily consumption, when, in point of fact, the consumption of gas or electricity will not average for all the burners more than 3 or 4 hours at the most.

Light-Dues. See LIGHT-HOUSE.

Lighter, a small licensed vessel or large barge, employed in the transshipment of goods. — A taper.

Light-House, a building erected on any part of the coast, or on islands at a little distance from it, to enable the sailor to determine the position of his vessel when it is approaching land at night, and to shape his course so that he may avoid any dangerous shoals, reefs, or headlands that may lie in its vicinity. *L.* are generally built in the form of a cylindrical tower, the lower chambers of which often afford accommodation for the keeper of the light and his family, while the uppermost story constitutes a gigantic lantern, being a room with glazed sides, and having a lamp in the centre. This is lighted at nightfall by the keeper, and burns with a brilliant flame, the light of which is reflected seawards for some miles by the aid of a combination of highly polished reflectors, or of lenses. There is generally some peculiarity in the appearance of the light shown by every *L.*, which enables it to be readily identified. In some a steady light is exhibited, which may be made to appear to be colored by transmitting it through a colored glass; while in others the light is intermittent, the light appearing at certain intervals of longer or shorter duration, or a flash of one color being sometimes succeeded by a flash of another color. The obscuration of the light for any fixed interval of time, or a change of color, is effected by bringing an opaque screen, or screen of colored glass, before the lamp, and withdrawing it successively, the revolution of the screen or colored medium being effected by machinery which is attached to it, and which is similar in its nature to clock-work. In places where the navigation is intricate on account of sand-banks and shoals, as it is at the entrance of any large tidal river, vessels are moored in the necessary positions on which the lights are displayed. Every vessel is provided with instructions respecting the peculiar way in which the light is exhibited from any *L.*, or floating-light, and its bearings with regard to other parts of the coast and headlands in its immediate vicinity, that the captain or master may be enabled to recognize the light, and so determine the position of his vessel. The distance at which any light can be seen, depends, of course, on the height of the tower, and varies with the state of the atmosphere. The greatest recorded distance at which an oil-light has been visible is that of the holophotal light of Allepey at Travancore, which has been seen, from an elevated situation, at a distance of 45 miles. The holophotal revolving-light at Baccalieu, in Newfoundland, is seen every night in clear weather at Cape Spear, a distance of 40 nautical miles.

The most celebrated of the ancient light-houses was the *Pharos* of Alexandria, erected B. C. 283; its height is stated, though probably with much exaggeration, to have been 400 feet; and it was accounted one of the seven wonders of the world. Among the most remarkable in modern times are, the *Tour de Cordouan*, erected in 1611, at the entrance of the Gironde, in France, the height of which is 186 feet, the *Eddystone*, a circular tower, constructed (1756–1759) on a rock distant 4 leagues S.W. from Plymouth Sound, which sweeps up with a gentle curve to the height of 86½ feet; the *Bell Rock*, erected near the entrance of the Tay, in Scotland, on the model of the Eddystone (1812); its height is 113 feet above low water; and *Minot's Ledge*, off the coast of Massachusetts, 8 m. E. S. E. of Boston Light, the base of which is 30 feet in diameter, and the whole height of the stone-work is 88 feet. So inefficient, inconvenient, and uncertain were the lamps or other means of artificial illumination known up to nearly the beginning of the present century, that nothing better could be found for the Eddystone Light-house for forty years after its erection than tallow candles stuck in a hoop. To M. Argand, a Frenchman, we are indebted for the first great improvement in lamps. The admirable invention which bears his name is an oil-lamp with a tubular wick, which occupies the annular space between two metallic tubes in such a manner that a current of air rises through the inner tube, and thus reaches the interior of the flame. This current, and the current which supplies the exterior, are increased by surrounding the flame with a tall glass chimney; and a contraction of the chimney, just above the flame, aids greatly in distributing the air so as to insure the complete combustion of the oil. In the original lamp the supply of oil to the flame depended on the capillary attraction in the meshes of the wick. M. Carcel applied clock-work to continuously pump up the oil into the burner, so that, by overflowing, it was maintained at an invariable level. This arrangement added greatly to the intensity and steadiness of the light; and, on account of the uniformity of its flame, the Carcel lamp has been selected as a standard to which, in France, photometric determinations are referred. The power of the Argand lamp, as employed in *L.*, is greatly increased by the plan of employing several concentric wicks instead of one. Between these wicks there are, of course, open spaces, through which the air obtains access to the flame, and the current of air is made more rapid by the use of a very tall chimney. The large amount of heat produced by the combustion of so much oil in a small space is partly carried off by the excess of oil which is made to overflow the burner, — about four times the quantity consumed being constantly pumped up into the burner for this purpose. *L.* lamps are made with two, three, and four wicks; and the oil is forced up in the burners either by clock-work or by the pressure of a piston loaded with a weight. — The efficiency of reflectors depends on the state of polish of the surface, and even with the most brilliant polish there is a very large loss of light. An attempt was made in England, about the beginning of the present century, to substitute glass lenses for mirrors; but it was Fresnel, the illustrious Frenchman, who successfully solved the problem He saw that it would be necessary to give the lenses a short focal length, and at the same time to have their diameters very great. The dimensions required by these conditions far ex-

ceeded any that could be given to lenses formed in the ordinary manner; and even if they could be formed, the great thickness of glass which would be necessary would diminish the transparency, and unduly increase the weight of the apparatus to the detriment of the revolving apparatus. Now occurred to his mind the idea of the *lentille à échelons* (lens in steps). The construction of this will be understood from Fig. 319, where *a b* is a section of a lens in steps, and the dotted line, *c*, shows the thickness an ordinary lens of the diameter *a b* would have. Fresnel kept only the marginal part of such a lens; and inside of the ring formed by this he fitted the margin of a second large lens having the same focal distance; inside of this another ring, and so on; and in the centre a large

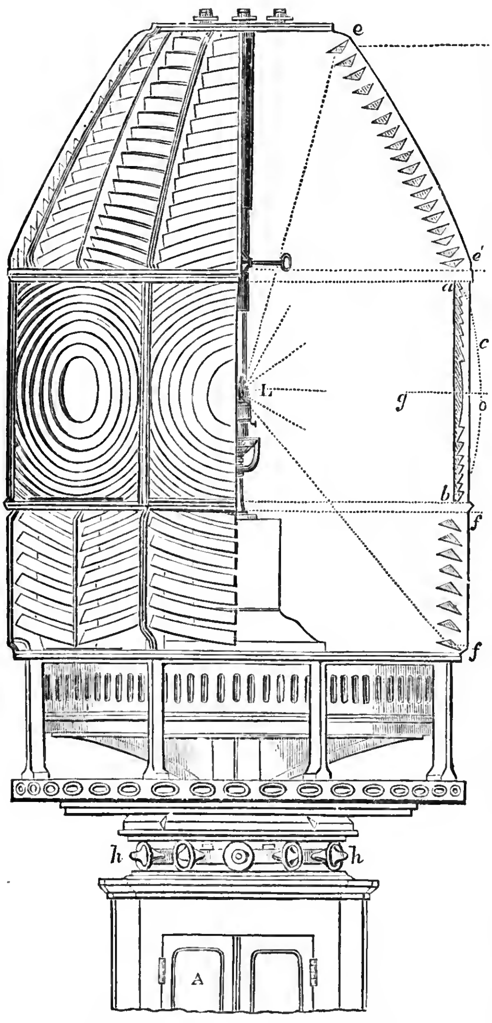

Fig. 319. — Fresnel's Revolving-Light Apparatus.

lense of moderate thickness. He also placed above and below the lens the concentric prisms, *e e'* and *f f'*, which by refraction and total reflections send the rays parallel to the axes of the lens. He saw that it would be useless to apply lenses in *L.* illumination unless the intensity of the light given out by the single-wick Argand lamps then in use could be considerably increased without much enlarging the flame. Accordingly he devoted himself, in conjunction with his friend Arago, to this preliminary consideration. Their studies and experiments led them to the construction of the lamp with several concentric wicks, — by which a brilliancy of light is obtainable twenty-five times greater than that of the single-wick Argand. The light which the improved lamp, when combined with Fresnel's lenses, could send to the horizon, was equivalent to that which would be given by the united beams of 4,000 Argand lamps without optical apparatus; and it was eight times greater than any which could be produced by the reflectors then in use. The first apparatus constructed on Fresnel's or the *dioptric* plan was placed on the Tour de Cordouan in July, 1823. France led the van in the erection of the most perfect *L.* in the world, and it was not until 1835 that a dioptric apparatus was employed in a British *L.*; but at the present time Fresnel's principle has been adopted in the majority of British *L.* All the *L.* of the U. States are now furnished with this apparatus. Fig. 319 is a part elevation, with the section, of a catadioptric apparatus of the first class. In plan it is a regular octagon, and it sends out eight beams, which are directed to the horizon, and made to sweep over the sea by its regular rotation, produced by clock-work, contained in the case A. The whole frame is very accurately balanced, and turns on its bearings, and the rollers, *h h*, with great smoothness and steadiness The moving power is given by the descent of a weight attached to a chain or cord, which is wound round a barrel. One train of wheels is connected with apparatus for regulating the speed, and to this an indicator is attached which registers the number of revolutions made in an hour. There is also a contrivance of some kind for maintaining the motion while the weight is being wound up. The reader will observe that all the light of the lamp, L, is utilized, except that which is directed towards the base and the top of the apparatus, — a quantity less than one fifth of the whole. About 45 per cent of the light emitted by the lamp falls on the refracting lenses; 25½ on the upper reflecting prisms; and 13½ on the lower reflecting prisms. The brightest part of the flame is placed so that the beams from it are directed towards the sea horizon, and the space between the horizon and the neighborhood of the *L.* receives ample light from the other parts of the flame. Thus a ship, or any part of the sea within the range of the *L.*, will see the light appearing at regular intervals, as one after another of the eight beams passes across it, the intervals being one eighth of the time in which the apparatus completes its revolution. — The electric light has been very successfully applied in certain *L.*, since the mode of producing steady currents by magneto-electric machines has come into use. — In Great Britain a tax called *Light-due* is laid upon every vessel, domestic or foreign, that uses the particular light which is to be supported. In the U. States, in France, and most of the other European countries the *L.* are a direct charge upon the treasury, and supported by annual appropriations; but, under different names, there is always a tonnage tax laid upon vessels, the proceeds of which are expended in the construction and repair of *L.*, piers, breakwaters, etc. By the navigation laws of the U. States, a duty of 50 cts. per ton, denominated by the law *Light-money*, is levied on all foreign ships or vessels entering into the ports of the U. States. In 1878 there were about 675 light-stations on the sea and lake coasts, and the shores of the various bays, sounds, and rivers of the U. States.

Light-Money. See Light-House.

Lightning-Rod, a bar of metal, or a collection of wires or bars of metal, attached in a particular manner to a building or a ship, and extending from below the level of the ground, or from below the sheathing of the ship, to a point several feet above the highest part of the building or ship. The object of these contrivances is to carry off the electric fluid.

Lights, the lungs of animals, some of which are cooked and eaten as food.

Light-Ship, Light-Vessel, a vessel bearing a light at night, anchored by moorings on a bank, or in the proximity of shoals, to guide navigators. See Light-House.

Lignite, a name given to those varieties of brown-coal which show distinct marks of having been formed of trunks of trees. They supply, in the districts in which they occur, a bad substitute for coal.

Lignum-Vitæ, a very hard and heavy wood, the produce of two species of *Guaiacum*, obtained in the West Indies. It is much used in machinery, for rollers, presses, mills, pestles and mortars, sheaves for ship-blocks, skittle-balls, and a great variety of other works requiring hardness and strength.

Lilac-Color, a purplish color of the tint of the lilac flower, used for mourning goods, and also for trimmings for ladies' spring dresses.

Lima. See Peru.

Lima-Bean, the *Phaseolus limensis*, an es-

teemed kind of pulse cultivated in the tropics; also the perennial kidney-bean (*P. perennis*).

Liman, a shallow, narrow lagoon at the mouth of rivers, where salt is made.

Lima-Wood, the finest description of Nicaragua-wood, produced on the west coast.

Limber Tar, the bilge-water, or refuse found in the hold of a ship that imports tar, which has drained from the casks during the voyage.

Limbs (Artificial). See ARTIFICIAL LIMBS in the Appendix.

Limburg Cheese. See CHEESE.

Lime, Quick-Lime [Fr. *chaux;* Ger. *Kalk;* It. *calcina, calce;* Sp. *cal*], the protoxide of calcium, an earthy substance of a white color, moderately hard, but which is easily reduced to powder, either by sprinkling it with water or by trituration. It has a hot, burning taste, and in some measure corrodes and destroys the texture of those animal bodies to which it is applied. Sp. gr., 2.3. There are few parts of the world in which *L.* does not exist. It is found purest in limestone, marble, and chalk. None of these substances is, however, strictly speaking, lime; but they are all easily converted into it by a well-known process, that is, by placing them in kilns or furnaces constructed for the purpose, and keeping them for some time in a white heat, — a process called the burning of lime. The use of *L.* as mortar in building has prevailed from the earliest antiquity, and is nearly universal. As a manure to fertilize land, it is very extensively used in Europe, and in an inferior degree in America. When water is poured upon quick-lime it heats, cracks, swells, and a bulky white powder is obtained, called *slaked L.* The limpid, colorless fluid, called *L.-water*, used as an antacid, is prepared by mixing powdered *L.* with warm water; and what is termed *milk* or *cream of L.* is merely slaked *L.* diffused through *L.*-water. *L.* is used as a medicine, and is of much importance in the arts, as a flux in the smelting of metals, in the shape of chlorate in bleaching, in tanning, and as a disinfectant, etc.

L.-Kiln is a furnace for converting limestone into *L.* by separating from it certain constituents which can only be removed by heat. The kiln may be an inverted cone, a cylinder, a cube, but is more usually shaped internally something like a skittle, swelling out in the middle more than at the top or bottom. Many ruder forms of kiln are used, according to the kind of fuel available, and there are many modes of varying the process. The following are some of the arrangements of *L.*-burning in different countries: — (1.) Alternate layers of coal or coke and limestone: 8 limestone to 2 coal or 3 coke. (2.) Fagots, then coal, then limestone in small pieces, then coal again, and so on; replacing at the top as fast as the calcined stone is removed at the bottom. (3.) Four parts turf and 1 part wood alternately with limestone. (4.) Limestone and peat alternating in kilns formed of peat. (5.) Furze to produce a blazing heat, with large pieces of *L.* built up into a mass over it. (6.) A somewhat similar arrangement, with additional appliances for burning bricks at the same time as calcining *L.* Some kilns are emptied at certain intervals, and refilled, whereas others work continuously, being supplied at the top as fast as *L.* is drawn out at the bottom. As *L.* is, practically, limestone *minus* carbonic acid, the details vary according as the kind of stone and the kind of fuel facilitate the escape of that gas.

Imp. duty: lime, 10 per cent.; white lime, 3 cts. per lb.; chloride of lime (bleaching powder), free; citrate of lime, free.

Lime [Fr. *Citronier;* Ger. *Citrone*], a species of lemon (*citrus medica*), which grows in abundance in most of the West India islands, and is also to be met with in some parts of France, in Spain, Portugal, and throughout India, etc. The *L.* is smaller than the lemon, its rind is usually thinner, and its color, when the fruit arrives at a perfect state of maturity, is a fine bright yellow. It is uncommonly juicy, and its flavor is esteemed superior to that of the lemon; it is, besides, more acid than the latter, and to a certain degree acrid. The juice is used for the same purposes as lemon juice. *L.* are largely imported from most of the West India islands for the manuf. of citric acid, and for use as an anti-scorbutic upon long sea-voyages. They come in barrels, or preserved in salt and water. *Imp.* duty, 10 per cent.

Lime-Light. See DRUMMOND LIGHT.

Limestone, a general term applied to a great variety of rocks which contain a certain quantity of lime, as calcareous spar, chalk, etc.

Lime-Tree, Linden-Tree, Bass-Wood, the *Tilia Europæa*, an ornamental lofty tree. The white soft wood is fine and close-grained, and is used for harps and piano-fortes, etc., and is particularly suitable for carving. The bark, when stripped off, is made into shoes, cordage, sacks for corn, matting, etc. The American lime-tree, *Tilia Americana* (Fig. 320), is regarded as one of the

Fig. 320. — AMERICAN LIME-TREE.

finest of forest trees, and, when cultivated, proves highly ornamental. It often rises more than 80 feet in height, and is frequently upward of 4 feet in diameter. It is found in Canada and the N. parts of the U. States. It becomes less abundant toward the South, except on the Alleghanies, where it is found quite at their termination in Georgia. It is profusely multiplied on the borders of Lakes Erie and Ontario, and in Maine, New Hampshire, and Vermont. The *Tilia Americana laxiflora* abounds from Maryland to Georgia, near the sea-coast. The *Tilia Americana pubescens* belongs to the S. parts of the U. States, Florida, Kentucky, and Texas. It is said to be the only variety found in the maritime parts of the Carolinas, Georgia, and Florida. The *Tilia Americana alba* is not met with E. of the Delaware River, but it is found in Pennsylvania, Maryland, Delaware, Virginia, Ohio, Kentucky, and Georgia. It is said also to grow on the River Santee, in South Carolina, and on the Mississippi.

The wood of the American lime-tree, when dry, weighs 35 lbs. to a cubic foot. It is very white when green, but becomes of a light-brown hue when seasoned It is soft, easily worked, and is often sawed into boards, which do not warp like those formed of resinous trees. In the N. parts of the U. States, where the tulip-tree does not abound, it is used for the panels of carriage bodies and the seats of chairs. In Kentucky and the W. States the wood of the white lime is often substituted for that of the white pine. In various parts of the country it is turned into domestic utensils of various kinds, and is also carved into images for the heads of vessels, and other orna-

mental work. The young trees are sometimes cut, and employed as rails for rural fences; but they are not durable when thus exposed. The wood is almost useless as fuel, being too full of sap when green, and of but little value when dry. The cellular integument of the bark is separated from the epidermis, and, after being macerated in water, is formed into ropes, after the manner of making them in Europe, of the other species. The outer bark of the *Tilia Americana* is rough and stringy, and the inner portion viscid and sweet. The twigs and buds are very glutinous when chewed, and afford considerable nutriment. In severe winters, when fodder is scarce, it is common for the farmers of Maine, New Hampshire, and Vermont to drive their cattle into the woods in the morning, and fell a bass-wood, or other tree, on which they eagerly browse during the day.

Lime-Water, water impregnated with lime, used as a steep for skins in tan-yards, for whitewashing, and for various other purposes.

Liming, Unhairing, in leather-manuf., the operation of removing the hair of hides by steeping them in lime-water or milk of lime, whose action is to dissolve the hair sheath and form a soap with the fat of the hide.

Limitation, Prescription, is the expiring of a right through lapse of time. In all civilized countries some period is prescribed by statute (called statutes of *L.* or prescription) with this view, though few countries adopt the same limit; and the States differ much from each other in this point. Generally, however, a statute of *L.* begins to run from the time at which a creditor is authorized first to commence suit. Upon mutual, concurrent, and open accounts the statute, in general, begins to run with the date of the last item. A debt, otherwise barred, may generally be revived by a new promise made within the period of *L.* The new promise may be either express, or implied from a part payment, or any unqualified acknowledgment from which a promise may be inferred. The following table shows the periods of *L.* fixed by statutes in the different States: —

State.	Open accounts.	Notes and contracts in writing.	Sealed instruments.	Judgments of a Court of Record.
	Years.	Years.	Years.	Years.
Alabama*	3	6	10	20
Arkansas (1)	3	5	5	10
Arizona*	2	4	4	5
California (2)	2	4	4	5
Colorado (3)	6	6	6	3
Connecticut (4)	6	6	17	17
Dakota	6	6	20	20
Delaware	3	6	20	20
District of Columbia	3	3	12	12
Florida	4	5	20	20
Georgia (5)	4	6	20	..
Idaho (6)	2	4	4	5
Illinois*	5	10	10	20
Indiana*	5	20	20	20
Iowa*	5	10	10	20
Kansas* (7)	3	5	5	..
Kentucky* (8)	5	15	15	15
Louisiana*	3	5	10	10
Maine (9)	6	6	20	20
Maryland	3	3	12	12
Massachusetts (10)	6	6	20	20
Michigan	6	6	10	10
Minnesota*	6	6	10	10
Mississippi (11)	3	6	7	7
Missouri	5	10	10	20
Montana*	5	10	10	10
Nebraska*	4	5	5	5
Nevada (12)	2	6	4	5
New Hampshire	6	6	20	20
New Jersey	6	6	16	20
New Mexico (13)				
New York	6	6	20	20
North Carolina	3	3	10	10
Ohio* (14)	6	15	15	15
Oregon*	6	6	10	10
Pennsylvania* (15)	6	6	20	20
Rhode Island	6	6	20	20
South Carolina	6	6	20	20
Tennessee*	6	6	10	10
Texas*	2	4	4	10
Utah* (16)	2	4	4	5
Vermont (17)	6	6	8	8
Virginia (18)	5	5	20	20
Washington*	5	6	6	6
West Virginia (19)	5	10	10	10
Wisconsin (20)	6	6	20	20
Wyoming (21)	4	5	5	..
Canada (22)	6	6	20	20

* In the States thus marked, it is provided by statute that a cause of action shall be barred, which first accrued in another State and is barred by the statute of *L.* of that State. This is contrary to the general rule, by which a debtor must have resided in the State during the statute period, before he can take advantage of it.

(1) Judgments of justice's court, 5 years. Judgment liens expire in 3 years.

(2) An action upon a judgment rendered or contract made out of the State is barred in two years.

(3) When the cause of action accrues without the State, the periods of *L.* are 2 years for notes and accounts; 3 years for sealed instruments and judgments.

(4) Promissory notes not negotiable are barred in 17 years. Demand notes, when indorsed, must be protested 4 months from date, without grace, to hold the indorser.

(5) Judgments become dormant in 7 years from date of last return on execution issued, but may be revived. Foreign judgments barred in 5 years.

(6) Sealed instruments, judgments, notes, in 3 years, if defendant resided out of Territory when the cause of action accrued.

(7) Judgments become dormant in 5 years, but may be revived.

(8) *Store accounts* for goods sold and delivered, 2 years from 1st January next succeeding date of last item. Merchandise accounts between merchants, 7 years.

(9) Witnessed notes, 20 years.

(10) Witnessed notes, 20 years.

(11) Foreign judgments barred in 3 years. Accounts stated, 3 years.

(12) Liabilities incurred out of State, 3 years.

(13) No limitation.

(14) Domestic judgments become dormant in 5 years, but may be revived in 21 years after they become dormant.

(15) Mercantile accounts are not affected by the statute as long as they remain open.

(16) Action "for specific recovery of personal property," or "for relief on the ground of fraud," 3 years.

(17) Witnessed notes, 14 years.

(18) Judgments of other States, period of *L.* under the law of that State, not exceeding 10 years. *Store account*, 2 years.

(19) Judgment of another States, same as in Virginia. *Store account*, 3 years.

(20) Judgments of other States and sealed instruments, when the liability accrued out of the State, 10 years.

(21) Judgments become dormant in 5 years. Foreign debts and judgments, 1 year.

(22) The *L.* of actions is matter of local regulation in the different Provinces, as it is in the different States of the U. States, but the periods given in the table are understood to be uniform throughout the Dominion.

Limited Liability. See PARTNERSHIP.

Limpet, a maritime edible mollusk, a species of which, *Patella testudinalis*, is common on the coast of New England.

Linch-Pin, a small iron pin put into the end of the axle-tree, to confine the wheels in carts, etc.

Lincoln Cheese. See CHEESE.

Linden-Tree. See LIME-TREE.

Line, a quantity extended in length only, without breadth or thickness. — The tenth or twelfth part of an inch. — A row of type. — The equator. — A railroad track. — The wire connecting one telegraph station with another. — On board ship, a running cord or rope; as bow-line, clew-line, deep-sea-line, etc. A name for heckled flax.

Linear Measure, the measures of length used in a country. See INCH, FOOT, MILE, YARD, etc.

Lined Gold, gold lined with baser metal, used

for jewelry and ornamental articles. It consists of a standard gold leaf, affixed to a leaf of some other metal, either by means of pressure when hot, or by a chemical process.

Line Engraving. See Copperplate Engraving.

Line-Maker, a manufacturer of rope, sash-lines, clothes-line, etc.

Line-Men, men employed on a railroad. — Persons carrying the measuring line for a surveyor.

Linen, from Latin *linum* (flax) [Dutch *lynwaat*; Fr. *toile*; Ger. *Linnen, Leinwand*; It. *tela, panno, lino*; Port. *panno de linho*; Sp. *tela de lino*], is strictly cloth woven from the fibres of the flax plant, though the term is likewise understood to comprehend all kinds of hempen cloth. This manufacture is of the highest antiquity. It appears to have originated in Egypt, where the plant is indigenous, and where the mummies are generally found swathed in *L.*, some of which is quite as fine as our common muslin, very strong, and of an even texture. *L.* fabrics are known in commerce by various names, according to their fineness, patterns, uses, places of manufacture, etc.; as cambrics, damasks, diapers, dornocks, dowlas, English, German, Hessians, Hollands, huckabucks, Irish, lawns, Osnaburgs, Scotch, etc., sheeting, towelling, etc. All *L.* goods may be bleached or unbleached, and bleaching may take place either in the yarn or in the fabric. The extreme whiteness given to some of them is frequently obtained at the expense of their strength, the material being partially worn out in the operation. The countries in which the manufacture of *L.* is most extensively carried on are France, Belgium, and Great Britain. The great seats of the manufacture in Great Britain are Leeds in England, Belfast in Ireland, and Dundee in Scotland (see Great Britain). This industry has been much neglected in this country, and most of the *L.* goods consumed in the U. States are imported. In the year of our last census there were only 10 manufactories of *L.* goods, mostly confined to the coarser kinds. The capital invested in them amounted to $2,325,250. — For the various manufacturing processes of L., the statistics of imports and exports, and the import duties, see Flax. See also Thread, Yarn, etc.

Lingel, a small thong of leather for sewing or lacing bands.

Lingot, an iron mould for casting metals.

Liniment, a medical term for an oily substance of a consistence intermediate between an ointment and oil, but so thin as to dry. The term is also applied to a spirituous or other stimulating application for external use.

Lining, the covering of the inner surface of anything, as of a garment or a box.

Linings, any kind of goods used for the inner surface of garments, as linen, glazed muslin, Farmer's satin, etc.

Link, a torch. — A ring or connection. — A portion of a chain; each link of Gunter's surveying chain, with the connecting ring, measures exactly 7.92 inches. — In steam-engine, one of the flat or round pieces of iron, with round holes at each end, which are used to connect, by bolts, different parts of the mechanism of the engine.

Link-motion is an ingenious apparatus for reversing a locomotive engine. The same arrangement is employed in other engines in which the direction of rotation has to be changed; and it serves another important purpose, namely, to provide a means by which steam may be employed expansively at pleasure. The link-motion is represented in Fig. 321, where A, B are two eccentrics oppositely placed on the driving-shaft, and their rods jointed to the ends of the curved bar or link, C D. A slit extends nearly the whole length of this bar, and in it works the stud E, forming part of the lever, F G, movable about the fixed joint, G, and having its extremity, F, joined to the rod H, that moves the slide-valve. The weight of the link and the eccentric rods is counterpoised with a weight, K, attached to the lever, I K, which turns on the fixed centre, L. This lever forms one piece with another lever, L M, with which it may be turned by pulling the handle of O P, connected with it through the system of jointed rods. When the link is lowered, as shown in the figure, the slide-valve rod will follow the movement of the eccentric, B, while the backward and forward movement of the other eccentric will only be communicated to the end of C, and will scarcely affect the position of the stud, E, at all. By drawing the link up to its highest position, the motion due to eccentric A only will be communicated to the slide-valve rod, which will therefore be drawn back at the part of the revolution where before it was pushed forward, and *vice versa*; hence the engine will be reversed. When the link is so placed that the stud is exactly in the centre, the slide-valve will receive no motion, and remain in its middle position; consequently the engine is stopped. By keeping the link nearer or farther from its central position, the throw of the slide-valve will be shorter or longer, and the steam will be shut off from entering the cylinder when a smaller or larger portion of the stroke has been performed.

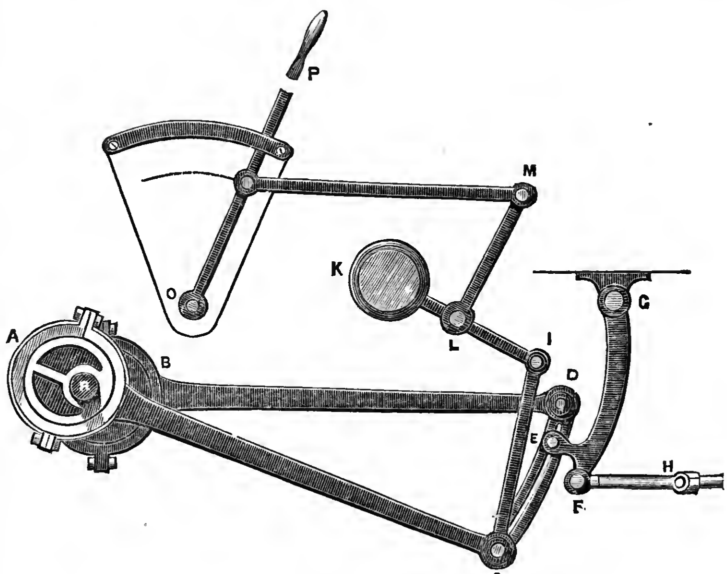

Fig. 321. — Link-Motion.

Linseed [Fr. *graine de lin*; Ger. *Leinsaat*; It. *linseme*; Russ. *semja lenjanve*], the seed of the flax-plant. It consists of small, bright, grayish-brown, slippery, elongated bodies, containing a mealy, oleaginous albumen, which yields, by expression, oil in such great abundance that the seed forms for this purpose, as well as for reproduction, an im-

portant article of trade. *L.* is preferred when bright and heavy, and especially that which, when bruised, appears of a light or yellowish green color, fresh and oily. It is produced in large quantities in this country, and is besides extensively imported from Bombay and Calcutta. See FLAX.

Imp. duty, 20 cts. per bushel of 56 lbs.

Linseed-cake, Oil-cake, is the cake left after the expression of the oil from the *L.* It is much used as food for cattle, and forms an important article of commerce in this country. In 1878, 342,446,439 lbs. of oil-cake, valued at $5,095,163, were exported, mostly to Great Britain and British West Indies.

Imp. free.

L.-Meal, the cake of *L.* from which the oil has been pressed, reduced to powder, which is much used for making poultices and for other purposes. The *L.* meal, however, as directed to be used in the Pharmacopœia, is merely *L.* powdered, hence it contains the oil, which is not present in ordinary meal.

L.-Oil is readily obtained from *L* by expression, the amount depending on the method adopted, and varying from 18 to 27 per cent. When freshly pressed it is of a golden yellow color, which turns to dark brown with age. The commercial oil has a peculiar smell and taste, but when fresh and cold pressed, it is without disagreeable taste. It boils at 600° F., and solidifies at about 4° below zero. Sp. gr. 0.940. *L.*-oil is especially remarkable for drying rapidly when applied to the surface of any body exposed to the air. It is extensively employed in the arts, particularly in the preparation of paints for wood-work, and in the manufacture of varnishes as a vehicle for the harder resins, to which it imparts softness and toughness. It dissolves oxide of lead when heated, by which it is decolorized and rendered more drying, forming what is called *boiled oil*. *L.*-oil is too frequently adulterated with common resin dissolved in it, with resin-oil, and with various fats and non-drying oils. Resin or resin-oil is detected by heating a small portion in a porcelain cup, when the peculiar odor of the substance will be noticed if only $\frac{1}{1000}$ part be present. To detect the presence of fats or non-drying oils, the practice is to touch the centre of a drop or two of the oil placed upon a white plate with a drop of sulphuric acid conveyed at the end of a glass rod; changes of color are thereby induced, and the formation of concentric rings of various shades will suggest to an experienced eye the nature of the oil and of its adulterations. *L.*-oil is largely manufactured at St. Louis and other places in the U. States. *Imp.* duty, 30 cts. per gallon of $7\frac{1}{2}$ lbs.

Linsey, Linsey-Woolsey, a kind of coarse cloth, of linen warp and worsted filling, undressed; made plain blue, or plain white, or striped blue and white.

Linstock, a gunner's match.

Lint, linen cloth scraped so as to raise a nap or pile, in order to make a soft and smooth surface suited for bandages for wounds. It is usually prepared by hand, but has sometimes been done by machine.

Imp. duty, (cotton) 35 per cent; (linen) 40 per cent.

Lip-Salve, glycerine or cold cream; some softening solution applied to chapped lips.

Liquation, the act or process of separating by fusion two metals unequally fusible.

Liqueur [Fr.], a palatable spirituous cordial composed of water, alcohol, sugar, and some aromatic infusion extracted from fruits, seeds, etc. Different liqueurs vary according to the proportions of sugar and alcohol contained in them. Among the French they are divided into three classes. First, the *ratafias*, or simple liqueurs, in which the sugar, the alcohol, and the aromatic substance are in small quantities. Among these are anise-water, noyau, and the apricot, cherry, and other ratafias. The second division consists of the oils, or fine liqueurs, with more saccharine and spirituous matter, as anisette, curaçoa, etc. The third are the creams, or superfine liqueurs, such as rosoglio, maraschino, Dantzig water, etc. In some cases the same aromatic infusion may give its name to two different liqueurs, according to the proportion of their constituent materials; as *eau de noyau* and *crême de noyau*. See SPIRITS.

Liquid Ambar, Liquid Amber, Copalm Balsam, a fluid balsamic juice, obtained by incision from *Liquidambar altingia*, a tree native to Java, and from *L. styraciflua*, a large American tree, found from Southern New England to Illinois, and southward to the Gulf and Mexico. This balsam, which resembles storax, is only developed in the tree in warm countries.

Liquidation, an arrangement or settlement of the affairs of a merchant or company; the clearing up or paying off accounts.

Liquid Manure, urine; a solution of guano or some other fertilizer to be applied to land.

Liquor, a term applied to distilled spirits used as beverages, as brandy, gin, whiskey, etc. See SPIRITS. — A dye or mordant in solution. — Any solution, as that of sugar, used in claying the loaves; or dilution, as liquor ammonia.

Liquorice, or **Licorice** [Fr. *bois de réglisse;* Ger *Sussholz;* It. *legorizia*], a perennial plant, *Glycyrhiza glabra*, a native of the South of Europe. The roots are very long, about an inch thick, flexible, fibrous; of a brown color, and when fresh, juicy; taste sweet, and slightly bitter. They are extremely apt to spoil, and it is necessary to preserve them in sand, or in some very dry place. Liquorice roots are an article of the Materia Medica, and are also in demand by brewers and druggists. They are used both in the form of extract and of powder, and are imported as drug.

L. extract or *juice* [It. *sugo di regolizia;* Sp. *regaliz en bollos o' pastillas*], called also Spanish juice, black sugar, or *Succus liquoritiæ*, is the inspissated juice of the fresh roots of *L.*, formed into cylinders or sticks 5 or 6 in. long, and an inch in diameter, and is largely imported from Italy, Turkey (Smyrna), and Spain, usually packed with bay leaves in cases of 200 to 300 lbs. It should be quite black, brittle when cold, and black with a smooth glossy fracture, have a sweet taste without empyreuma, and be almost soluble in water. It is chiefly used by tobacconists in the manufacture of chewing tobacco. It is also used in medicine, particularly in tickling coughs. The best comes from Calabria. The Spanish is frequently so grossly adulterated as to be scarcely marketable.

L. paste is *L.* refined by dissolving the impure extract in water without boiling, separating the insoluble matters and also the acrid oleo-resinous portions which by long boiling were extracted from the root, and reforming the article in cylinders of the size of pipe-stems. It is commonly adulterated with sugar, flour, starch, and gelatine.

Imp duty: juice, 5 cts. per lb.; paste, and in rolls, 10 cts. per lb.; root, free.

Liquoriste [Fr.], a compounder of liqueurs.

Lira. See ITALY (MONEYS), page 619.

Lisbon. See PORTUGAL.

Lisle [from the city of that name in France], a light, fine, transparent, white, hand-made thread lace, with a diamond-shaped mesh, formed by two threads plaited to a perpendicular line. It is also called *clear foundation*. — The name is also given to fine summer gloves; and to hard-twisted cotton thread, from which are made very thin and fine cotton stockings, called *Lisle-thread stockings*.

Lissé [Fr.], a kind of silk. — Boiled sugar; *amandes lissées* are sugared almonds.

List, a list, register, or catalogue; detailed particulars. — A narrow selvage strip torn from the edge of cloth, used for various purposes. — The inclination of a vessel to one side, as when laden heavier on that side than the other.

List Shoes, a kind of easy slippers made of strips of cloth woven together.

Litchi, the edible fruit of *Nephelium litchi*, a small Chinese tree. It is borne in clusters, is globular, about $1\frac{1}{2}$ inches in diameter, and when fresh is filled with a sweet, white, nearly transparent, jelly-like pulp, within which is a single seed. The Chinese esteem it above all other native fruits. In the dry state, as it is occasionally imported, the very thin, handsomely marked shell is of a reddish brown color, and partly empty from the shrinking

of the pulp in drying, which tastes somewhat like prunes.

Literary Property. See COPYRIGHT.

Litharge [Fr. *litharge;* Ger. *Glätte;* It. *litargirio;* Sp *almartaga, litargirio*], a semi-vitrified oxide of lead, in the form of small, shining, heavy scales, or more or less agglutinated masses. It is usually produced in the purification of silver from lead, and the refining of gold and silver by means of this metal. According to the degree of fire and state of oxidation, it has a pale or a deep color,— the one is called *L.* of silver, and the other *L.* of gold. *L.* is employed in medicine, and by potters, glass-makers, painters, and others.

Imp. duty: dry or in oil, 3 cts. per lb.

Lithograph, a print from a drawing on stone by the lithographic process. Both lithographs and chromos are commercially regarded as engravings. See LITHOGRAPHY.

Lithographer, a writer or designer on stone; also a workman who takes impressions from lithographic stones.

Lithographic-Stone, a fine oölite or granular limestone used in lithography: good stone should be of a uniform yellowish gray hue, free from veins and spots, cut by a steel point with difficulty, and in splintering it should show a conchoidal fracture. Stones that have been once used are used again after obliterating the old marks. The very best stones are still those obtained from the quarries of Solenhofen, in Bavaria; but good stones are now found in Alabama, Canada, France, Italy, etc. They are imported in slabs and sold by the pound. See LITHOGRAPHY.

Imp. free (when not engraved).

Lithography, the art of tracing letters, figures, or other designs, on stone, and of transferring them to paper by impression. The process is a chemical one, based entirely on the antipathy which exists between water and oil, or grease of any kind, and which prevents them from entering readily into combination. This will be seen from the description of the method by which lithographic printing is effected; and as the impressions are taken from a plain and even surface, which is prepared to receive printer's-ink in some parts and to reject it in others, it differs entirely from ordinary printing from movable type and wood-engravings on the one hand, in which the impression is derived from projecting pieces of the original surface, between which spaces have been cut away by the graver,— and from printing from steel and copper plates on the other, in which the impression is obtained from hollow lines that are sunk below the surface by the corrosive action of acid and by the etching-needle and engraver. This art was invented about 1795 by Aloysius Senefelder, of Munich, who endeavored to keep his processes secret, and, having obtained the exclusive right of exercising his invention in his own country, attempted to carry on all the operations himself. Little by little, however, the general nature of the process became known, and although the details were jealously concealed, ingenious persons in France and elsewhere, by force of experiment, succeeded in re-inventing the art for themselves, and Senefelder never profited by his invention as he should have done. The French designers excel in fine-art *L.*, and many beautiful productions of their crayons have been published in every department of pictorial illustration. The art was introduced in America in 1821, but it is only within the last few years that portraits and other works of true merit have been produced, in this country, by Sarony and other artists.

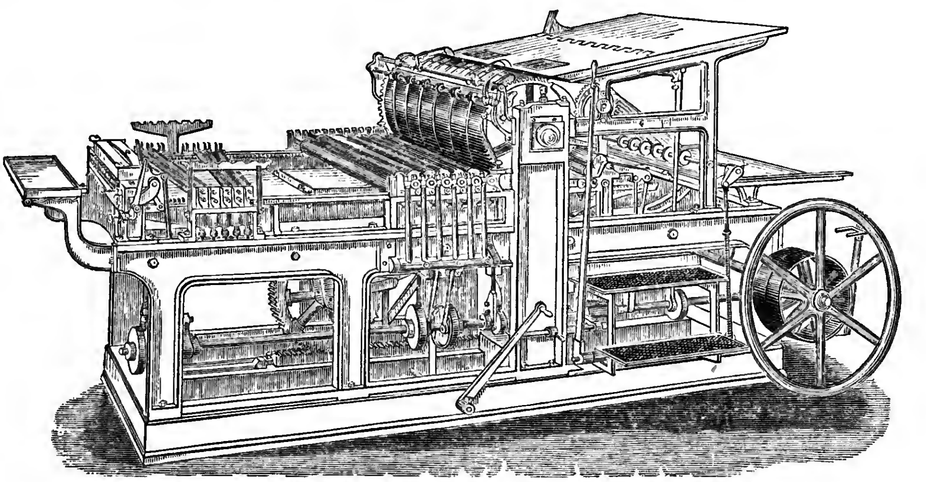

Fig. 322.— LITHOGRAPHIC PRESS.

The stones for *L.* are prepared in much the same way as slabs of marble are polished; that is to say, by rubbing one slab against another with sand and water. When the stones have thus been brought to a plane surface, they are finished according to the purpose for which they are intended. If they are intended to receive written characters, they are polished to a very smooth surface by means of pumice-stone. But if they are to take drawings, then a certain uniform grain is given by means of finely sifted sand, the operation being performed in a similar manner to that in which the stones are dressed, only pressure is not applied to the upper stone. The stones, after being washed and dried, are carefully covered on their prepared surfaces with thin paper, and are sent out for use.— When the stone is employed to reproduce written characters, or drawings imitating those done with a pen, *lithographic ink* is made use of with an ordinary pen, a ruling-pen, a fine brush, or a pen which the lithographer makes for the occasion out of thin metallic plates. The composition of the ink varies much: the usual ingredients are wax, gum-mastic, gum-lac, soap, and lamp-black. This composition forms a solid, which is rubbed down with water to a thick liquid when required for use.— The characters have, of course, to be written on the stone in a reversed position, and the lithographer acquires the habit of doing this with neatness and dexterity. He is provided with a looking-glass for viewing his work, in order to see the effect which will be given by the impression, for the look-

ing-glass shows the characters in their usual position, just as the image of ordinary writing seen in it is reversed, showing, in fact, the very appearance the characters present on the stone. For a drawing, a *lithographic crayon* is used, made of wax, soap, grease, lamp-black, and other ingredients. With this the drawing is made on the stone exactly as on paper, save the necessary reversals. — When the design has been placed on the stone, a liquid containing nitric acid and gum is poured over it. This liquid acts on all the parts of the stone not protected by the ink or crayon: they are thus rendered incapable of receiving printing-ink, while the protected parts have the impression more strongly fixed; for when the stone has been well washed with water, and turpentine has afterwards been applied, so that all the matter used in marking the design is dissolved away, the seemingly obliterated characters reappear when — after the stone has been lightly wiped with a damp sponge — the roller charged with printer's-ink is applied. The ink is taken up by the stone only at those places which have not been acted on by the acid. The impression is obtained by laying a sheet of damp paper on the inked stone and applying pressure by means of a roller, under which the stone passes. The stone is moistened with water after each impression before the inking-roller is again applied. — The lithographic stone, like other originals used in printing, is liable to deteriorate when large numbers of impressions are taken from it. This would be a serious drawback in *L.*, but for a method of renewing the impression, which renders it unnecessary for the artist to retouch his work. This is the process of *transferring*, which is practised by the aid of a certain kind of paper specially prepared by a coating of paste. On this a proof is taken from the original drawing on the stone, and the still moist sheet is then applied to another stone, with the face downwards, and passed under the press. The effect of the pressure is to cause the adherence of the layer of paste to the stone; and when the paper has been thoroughly wetted at the back, it may be removed, leaving the paste still adhering to the stone, with the impression beneath it. When water is applied, the paste is washed off, while the ink of the impression remains attached to the stone, there reproducing the design drawn on the first stone. The transferred design is treated in exactly the same manner as the original drawing, acid being poured over the stone, etc., and the impressions obtained by the same method of successively sponging, inking, and pressing. The transferred drawing may be made to yield another transfer, and so on indefinitely; but when a large number of impressions from one design are required, it is usual to make at once from the original as many transfers to separate stones as will yield the required number of impressions without deterioration. In this way as many as 70,000 copies have been taken from a single drawing without their showing any marked difference in the character of the impressions. — The transfer process is also applied to place on the stone characters which have been written with a pen in the ordinary manner on prepared paper. In this way a person's handwriting is so accurately reproduced in the impressions that it is often very difficult to detect the interposition of the lithographic stone, and the impression often passes as the immediate production of the writer's pen. It is obvious that drawings etched with the pen on transfer-paper can be printed from in the same manner. And line engravings, which have been originally produced by cutting hollow lines on polished plates of copper, can be printed lithographically by transferring an impression to the stone. By transfer also the impressions of raised types or of woodcuts can be printed from the stone when desirable.

A beautiful and important application of *L.* to the reproduction of pictures in colors has been so successfully carried out that a new branch of the art, termed *chromo-lithography*, now gives fac-similes of water-color drawings and of paintings in oil. The copies of water-color drawings especially are remarkable for their artistic qualities, and it is undeniable that these cheap reproductions of good paintings have done much to extend the knowledge of art. It is not contended that a chromo-lithograph, for example, after one of William Hunt's rustic figures, or birds'-nests with banks of primroses, can possess the wonderful refinement of the original; but it will nevertheless convey much of the artist's sentiment. Such transcripts of the works of the best artists adorn the homes of thousands who have never perhaps had the opportunity of even seeing the painter's original handiwork. In many a remote settlement in distant colonies, as in many an American or English home, the chromo-lithograph is the brightest of the household art treasures. — The principle of chromo-lithography consists in printing on the same paper with inks of various colors from different stones successively, so as to produce, by the juxtaposition and superposition of the various tints, the effect of a colored drawing or painting. The artistic effects of the best chromo-lithographs require a great number of printings for their production, in some cases as many as twenty different stones being employed. The stones and colors for such productions require true artists to prepare them, persons who can thoroughly understand and enter into the spirit of the original work. The first operation consists in the preparation of a faithful but spirited outline of the original, etched on transfer-paper, from which the outline is placed on a lithographic stone. This sketch we have called an outline, but it is in reality something more; for it should suggest all the markings and limits of tints which belong to the original. This first sketch has some points marked on the margin by dots or crosses, which serve to secure true register in the subsequent processes; that is, the impressions of the successive tints are so placed on the press that these points coincide in each impression. — From the first stone as many impressions of the sketch are transferred in light ink to other stones as there are colors required in the reproduction. To each color a special stone is assigned, on which the lithographer, guided by the slight impression of the sketch, draws with the ordinary black crayon the form which that color is to produce on the paper. Much artistic skill and judgment are required to do this in such a manner as to obtain a clear and harmonious final result. The gradations of the colors, and their blendings by superposition, must be carefully regarded. When the form and limits of each color have been skilfully laid down upon its own stone, the surface is acted on by the acid, it is washed, the ink is dissolved off by turpentine, the stone is sponged, and the roller, charged with ink of the appropriate tint, is passed over it. The ink, as before, adheres only to the parts over which the crayon has passed, and an impression may be drawn off. Each of the other stones is similarly treated, and, when the whole are ready, a proof is taken by giving the same sheet of paper the whole series of impressions in their proper order and colors, with the greatest possible accuracy of register. If any alterations appear desirable, they are made accordingly, by aid of certain devices which need not be here described, and, when a satisfactory result has been obtained, the printing of the whole series of impressions is proceeded with. When the number of these is very large, transfers of each stone are taken as in ordinary *L.*, only with certain extra precautions for obtaining precision in the register. Until within the last few years the best *chromos* were made in Paris and Vienna, but some of our American artists now produce works which are excelled by none in Europe.

The brilliant effects produced by using gold and silver in *L.* are obtained by using a kind of varnish, instead of colored ink, for printing those parts where the metal is to appear. When this varnish has acquired a certain stickiness by partial drying, powdered gold or silver is applied, and this attaches itself only to the varnish; when the sheet is dry it is passed under a burnished steel roller, the pressure of which imparts a brilliant lustre to the metal.

A method of color-printing, in some respects resembling that of chromo-lithography, is practised by printing in variously colored inks from a series of wooden blocks. This admits of far greater expedition in working off the impressions than the process with stones. The gradations of the colored inks and powdered tints are produced in the same manner as those of ordinary woodcuts in black and white; and when the colors are well chosen, and care is taken to secure the accurate superposition of the impressions, very pleasing effects can be produced by this means. See also PHOTO-LITHOGRAPHY.

Lithontriptor, a surgical instrument used to crush the stone in the bladder into minute fragments, so that they may pass out with the urine.

Litho-Photography. See PHOTO-LITHOGRAPHY.

Lithostrole, a sort of mosaic pavement.

Litho-Tint, a lithographic process, which consists in applying the ink to the stone by a camel's-hair pencil.

Lithotomy Forceps, a surgical instrument used to extract stone from the bladder through the opening made by a bistoury or scalpel called *lithotome*.

Lithotype, a stereotype-plate obtained by the process of lithotypy.

Lithotypy, the process of making a peculiar kind of stereotype-plate, by pressing into a mould taken from a page which has been set up, a composition of gum-shellac and sand of a fine quality, together with a little tar and linseed-oil, all in a heated state. A plate is thus formed, which, though soft at first, becomes, when thrown into cold water, as hard as stone.

Litmus [Fr. *tournesol*; Ger. *Lackmus*], a violet-blue dye, prepared chiefly in Holland from a lichen (*Lecomora tartarea*), which grows in the Canary and Cape de Verde Islands. It is imported in small cubical cakes, of a dusky blue color, light, and easily pulverized. It is employed to stain marble; also as a chemical test of acidity, being reddened by acids, while the blue is restored by alkalis; for this purpose it is employed either in

the form of a tincture, or of unsized paper colored with it.

Imp. free (prepared or not).

Litre, Liter, the French standard measure of capacity in the decimal system. The litre is a cubic decimètre; that is, a cube, each of the sides of which are 3.937 English inches: it contains 61.028 English cubic inches, and is, therefore, rather less than our *quart*, more precisely, 0.26418 gallon.

Litrometer, an instrument for ascertaining the specific gravity of liquids.

Litter, a carriage with a bed for an invalid or wounded person, conveyed by hand or by horse. — Scattered straw, etc., as a couch or bed for beasts. — The young produced by small animals at one birth. — Confusion, or a careless arrangement.

Little Miami R.R. runs from Cincinnati, O., to Columbus, O., 120.4 m.; leased lines and branches, 74.5 m.; total, 194.9 m. This Co., whose offices are in Cincinnati, O., leased the road and leased lines in 1869 to the Pittsburg, Cincinnati, and St. Louis R.R. Co., for the term of 99 years, at an annual rental of 8% on the cap. stock, the interest on the funded debt, $5,000 yearly, for expenses of organization, and the fulfilment of the lease obligations to its own leased lines. The road is operated by the Pennsylvania Co. Cap. stock, $4,636,200; funded debt, $2,104,000.

Little Rock and Fort Smith R.R. runs from Little Rock, Ark., to Fort Smith, 165.16 m. This Co., whose offices are in Little Rock, was reorganized in 1874, after sale under a foreclosure of mortgage; it has a land-grant for 1,085,150 acres, of which but a small part seems to have been sold. Cap. stock, $5,000,000; funded debt, $3,000,000.

Little Rock, Mississippi River, and Texas R.R. runs from Arkapolis to Pine Bluff, Ark., 75 m., and from Arkapolis to Collins, Ark., 25 m. The co. was reorganized after foreclosure of the Little Rock, Pine Bluff, and New Orleans and the Mississippi, Ouachita, and Red River R.R. Cos. Cap. stock (representing the bonds of the old companies), $2,606,900; funded debt (1st mortgage 7% 20-year bonds, due Jan. 1, 1896), $1,250,000.

Littoral, belonging to or growing on the shore of the sea; extending along a coast.

Liverpool. See Great Britain.

Livery, the particular dress or uniform worn in Europe by male servants.

Livery-Stable, a stable where horses are kept or stabled for hire.

Live-Stock, animals kept for use, to be dealt in, or vended, or for their produce; the term chiefly applies to cattle, but includes poultry, and even rabbits, in some districts; while in many countries, fish, bees, silk-worms, etc., are of sufficient importance to be included in the category of live-stock. The term, however, is more generally restricted to *Horses, Mules, Oxen, and other Cattle, Milch-Cows, Sheep*, and *Hogs*, which are given in this work under their specific names.

Living, means of subsistence, estate, livelihood.

Livraison [Fr.], a serial issue; the number or part of a literary work published and delivered periodically.—The commercial name for a partial transfer of goods, in contradistinction to the actual receipt and acceptance by the purchaser, which constitutes a delivery.

Livre [Fr.], a book. — The integer of account in the old system of France. The Revolution changed the name into *franc*. — Also the ancient French unit of weight, equal to 17.267 oz. avoirdupois. The kilogramme, of which the gramme is the unit, has taken its place.

Lizard, on shipboard, a piece of rope having one or more legs with thimbles acting as fair-leaders or for other purposes.

Lizard-Stone, a name for the serpentine marble stone obtained in Cornwall, England, in the vicinity of the Lizard Point, which is worked up into chimney-pieces, ornaments, etc.

Llama. See Lama.

Lloyd's [From a person of the name of Lloyd, who kept a coffee-room in Abchurch Lane, Lombard Street, London], a number of rooms in the Royal Exchange of London, frequented by underwriters, merchants, ship-owners, ship and insurance brokers, and others, chiefly for the purpose of obtaining shipping intelligence, and of transacting business connected with marine insurance. The principal room is that of the underwriters, in which two enormous ledgers lie constantly open, the one containing notices of *speakings*, or ships spoken with, and arrivals of vessels at their various destinations; the other recording disasters at sea. All intelligence is entered immediately upon its reception, without removing the ledgers from their places, in order that they may at any moment be inspected by those interested in their contents. The underwriters are persons who, for a premium, grant an indemnity to merchants against risks by sea; and they are so called from the custom of *writing* their names *under*, or at the foot of the policies of insurance. The method of *effecting* an insurance at Lloyd's is the following: When a broker receives an order to insure interest to a certain amount in a particular ship, he writes upon a slip of paper the name of the vessel, the master's name, the nature of the voyage, the subject to be insured, and its value, and any other information which the circumstances of the case may require. He then offers the risk to different underwriters until the value of the interest to be insured is exhausted, each underwriter subscribing his name opposite to the amount he engages to insure, and all agreeing to accept a uniform premium. The insurance is now virtually effected; the stamped policy being afterward extended from this slip. This distribution of the risk among many individuals is, of course, very conducive both to the solvency of the underwriter and to the security of the insured. The number of underwriters is under 200; but some idea of the immense amount of insurance business done at Lloyd's may be derived from the fact, that the value of the interest annually insured at the present is estimated at about $400,000,000. No person is permitted to transact business at Lloyd's as an underwriter or insurance broker until he shall have been duly admitted as a member, and shall have paid an entrance fee. — The shipping intelligence received at Lloyd's is furnished by agents, who are appointed for the purpose; and as there is scarcely a port of any consequence where one is not resident, their number is very large. The information which each transmits to headquarters is regular, accurate, and complete. It is furnished by means of *letters*, signed by the agents, and by means of the newspapers, and shipping lists which are published at the various ports. The intelligence, besides being made known to the members of Lloyd's by means of the ledgers, of which we have already spoken, is published every afternoon in *Lloyd's List* for diffusion over the country. The management of Lloyd's lies with the subscribers, who select a committee from their number for the purpose, called the "Committee for managing the affairs of Lloyd's." This committee appoints the agents and the officials of the establishment. The ex-

penses connected with the establishment are defrayed by the fees and annual subscriptions.

For many years the association has superintended a registry of the qualifications of ships of the whole world; which, upon the reports made of them by surveyors, are ranked in different classes, and a preference given as to employment and insurance, according to the place assigned to them. Until 1834 the age of the ship was held to be conclusive evidence as to her deterioration, without reference to original quality or repairs; but this regulation having led to the building of ships with little regard to durability, and to the application of repairs as sparingly as possible, the system of classification was in that year thoroughly reformed. Ships are now classed according to their real and intrinsic qualities at the time of survey; and thus every inducement is presented to build them in a substantial manner, and to give them thorough repairs as often as needed. The rules for the guidance of owners are stated in detail in the Register Book, which is published annually. The principal are the following: —

First-Class Ships. — *First Description* comprises all which have not passed a prescribed age, provided they are kept in a state of complete repair and efficiency; and they are designated by the letter A. — The period of continuance in this class varies from four to twelve years, according to the original construction and quality of the vessel, the materials employed, and the mode of building; but after the expiration of the prescribed period, ships are permitted to remain in this rank, or to be restored thereto for a further limited period, on the conditions after mentioned. — If, on the termination of the period of original designation, a ship-owner should wish to have his ship *remain* on the letter A, he is to send a written notice thereof to the committee, who then direct a special survey to be held; and if, from the report of such special survey, the ship shall appear to be in all respects in a sound and efficient state, and to have preserved her original form unaltered, the committee will *continue* such ship on the letter A for such further period as they may think fit, — not exceeding, however, one third of the number of years which had been originally assigned. — If, at any time before the expiration of two thirds of the number of years, *beyond* the period for which ships may have been originally assigned to remain in the First Description of the First Class, an owner be desirous to have his ship restored to that description, such restoration (after survey and repairs) will be granted for a period not exceeding two thirds of the time originally assigned for the remaining therein; the same to be calculated from the date of such repairs. — If, *at any age* of a vessel an owner be desirous to have the ship restored to the First Description of the First Class, such restoration (after survey and repairs) will be granted for so long a period as may be deemed expedient by the committee, not exceeding in any case the term of six years. — On the same principle of giving every proper advantage to ships which shall be actually proved to be superior of their class, and in excellent condition, ships which have been *restored* to the class A shall be entitled to an extension of the time; but the term of such extended continuance shall be limited to a period not exceeding one third of the number of years for which the ships may respectively have been *restored*, without any reference whatever to the period originally assigned to them. — *Second Description* comprises all ships which having passed the prescribed age, but have not undergone the repairs which would entitle them to be continued in or restored to the First Description, or having been continued or restored, and the additional period thus assigned having expired, — appear on survey to be still in a condition for the safe conveyance of dry and perishable cargoes; and they are designated by the diphthong Æ; but such of the ships of this class as are found on survey to be of superior description, being fit for the conveyance of dry and perishable goods *to and from all parts of the world*, are distinguished by an asterisk, thus prefixed *Æ. — For the purpose of continuing a ship in this class a careful survey is required annually, or on the return from every foreign voyage; but if not surveyed within twelve months after entering the Second Description of the First Class, such ship having been during that time in some port in the United Kingdom, the character will be omitted until such survey be held; or, as the case may be, she will be allowed to pass into the class E

British North American built ships, and ships built in India, are subject to special rules of classification.

Second-Class Ships comprise all found on survey unfit for carrying *dry* cargoes, but perfectly fit for the conveyance *to and from all parts of the world* of cargoes not in their nature subject to sea-damage, and they are designated by the letter E. Subject to occasional inspection, ships are continued in this class so long as their condition shall, in the opinion of the committee, entitle them thereto.

Third-Class Ships comprise those in good condition, and found on survey fit for the conveyance on *short voyages* (not out of Europe) of cargoes in their nature not subject to sea-damage; and they are designated by the letter I.

Steam Ships require to be surveyed *twice in each year*, when a character is assigned to them according to the report of survey as regards the classification of the hull and materials of the vessel. That, with respect to the boilers and machinery, the letters "M C" are inserted in the Registry Book, when at those periods the owners have delivered to the surveyors the certificate of a competent master-engineer that they are in good order.

The *stores* of all classes of vessels are designated by the figures 1 and 2, — 1 signifying that the vessel is well and sufficiently found; 2, that she is deficient in either quantity or quality. Thus "12 A 1" denotes a twelve-years ship of the first description of the first class, with stores well and sufficiently found.

The case of damages to ships is subject to special regulations; but the class of a ship is never reduced before communicating in writing with the owner, master, or agent.

The name *Lloyd* or *Lloyd's* has been borrowed by several similar associations in various parts of Europe. The most important are the Trieste, or Austrian Lloyd's, established at Trieste in 1833; and the North German Lloyd's (*Norddeutscher Lloyd*), established at Bremen.

Load, the charge of a gun. — The amount of work made by an engine working up to its capacity. — A burden or freight. — A defined quantity of different commodities or bulky merchandise, as, in England, 5 quarters, or 40 bushels of corn; 500 bricks; 9 dishes, or nearly 3 cwt. of lead ore. See Cart-Load, Timber, etc.

Loadstone, a natural magnet. See Magnet.

Loaf, a thick mass of anything. — A large cake or shape of bread of different weights and kinds.

Loaf-Sugar, solid white or refined bleached sugar, which has been run into long moulds or shapes, and purified from the molasses.

Loam, a clay containing a large proportion of silex, and occasionally used for polishing common articles by manufacturers.

Loan, money lent at interest; anything lent. See Banking, Interest, National Debt.

Lobby, a small hall or waiting-room; the entrance into a principal apartment.

Lobelia, a handsome genus of plants, some of the American species of which, although dangerous in their properties, are used medicinally, especially *L. cardinalis* and *L. siphilitica;* spirit or ethereal tinctures of the Indian tobacco herb (*L. inflata*) are medicinally prescribed in spasmodic and asthmatic attacks, as an expectorant, and as an emetic; but should only be given in very small doses, or may else prove fatal.

Loblolly Bay, the *Gordonia lasianthus*, a beautiful American sub-evergreen tree, growing to the height of 50 to 60 feet, which appears to be confined to the maritime ports of the U. States, from Virginia to lower Louisiana. Its wood is extremely light, a cubic foot of which, when dry, does not weigh more than 20 pounds. In trunks of these trees which exceed more than 15 inches in diameter, four fifths of the wood is heart; it is of a rosy, or mahogany hue, and of a fine silky texture, which render it very proper for the inside of furniture, though the cypress is generally preferred. When seasoned it is exceedingly brittle, and rapidly decays when exposed to the alternations of moisture and dryness. The bark may be taken off this tree during three months of the year, which shows that the sap is in vigorous motion a much longer period than it is in most other trees. The value of the bark in tanning compensates, in some measure, for the uselessness of the wood, for which purpose it has been employed in times past, throughout the maritime ports of the southern States and Florida.

Lobster, a long-tailed crustaceous animal found in abundance on the rocky coasts of New England. They are caught by traps or pots made of twigs, baited with garbage; also by baited nets; and in some countries by torchlight, with the aid of a kind of wooden forceps. In summer, when they deposit their eggs, they are found near the shore;

in winter they are seldom taken in less than 12 or 15 fathoms. A sizable animal is from 1 to 2 lbs. in weight. The common *L.* of the U. States, *Homarus Americanus* (Fig. 323), has claws much larger in proportion than the European species. In a commercial point of view the *L.* is perhaps the

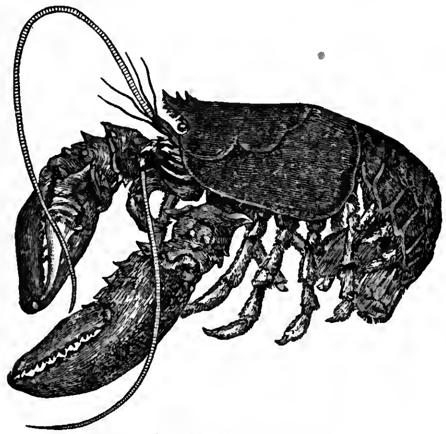

Fig. 323. — AMERICAN LOBSTER.

most important of all the crustaceans on account of the esteem in which it is held as an article of food, though the meat is rather indigestible. The great mart for *L.* in this country is Boston.

Lock [Fr. *serrure;* Ger. *Schlöss;* It. *serratura;* Port. *fechadura;* Sp. *cerradura*], a well-known instrument, of which there are infinite varieties. A *bolt lock* has a bolt which cannot be driven or withdrawn without the action of a key. A *latch lock* can be opened by a handle on the inside, and by a key on the outside. Other designations are *in-door, out-door, iron rim, spring, brass case, mortise, dead* or *closet, two-bolt, knob* or *ring, right-hand, left-hand, one-ward, two-ward, one-wheel, two-wheel, solid, cabinet, cupboard, bookcase, table, desk, drawer, box, caddy, chest, carpet-bag, puzzle, padlock,* and many others. In a plain lock of simple construction the key, on entering the key-hole and being turned round, draws back the bolt, and opens the lock. If this were all, there would be no security, seeing that any blank key could open it. Therefore the interior of the lock is provided with *wards,* and the key with clefts corresponding to them: no key can pass among the wards unless it has the proper kinds of clefts or openings. The wards are made of small thin pieces of iron or brass, and vary greatly in number and shape. The *bit,* or square portion of the key, varies in shape and thickness as well as in depth, to suit the wards of the lock. Most small keys are *pipe* keys, having a small barrel that fits upon a pin in the lock; but street door keys are usually solid, and can open the lock both from within and without. Locks of a better kind have *tumblers* instead of wards: the tumblers are small movable or hinged pieces of metal within the lock, which must be first shifted or lifted a little out of their place before the key can act upon the bolt. The *letter* lock, *puzzle* lock, or *combination* lock, has usually a number of rings placed with their plane surfaces in contact; every ring revolves on an axis; and the lock cannot be opened until all the rings are brought into exactly defined positions. A great deal of art and delicacy is sometimes displayed in contriving and varying the wards, springs, bolts, etc., and adjusting them to the places where they are to be used, and to the occasions of using them. From the various structure of locks, accommodated to their different intentions, they acquire various names, as stock locks, spring locks, padlocks, etc. The grand difficulty to be overcome in making a lock is to construct it so that it may not be opened by any key except its own, nor admit of being picked; it should also be possessed of sufficient strength and durability, and not be too complex. Many ingenious contrivances have been proposed for the attainment of the desired security, several of which are possessed of much merit. And though we believe that no lock has hitherto been constructed that may not (if proper facilities are given) be picked, yet it is true that some of the best locks, such as those made by Messrs. Bramah, Chubb, Mordan, Hobbs, Yale, Andrews, Newell, Marvin, and other first-rate artists, are so very difficult to pick, that the security which they afford may, in a practical point of view, be regarded as all but perfect. *Detector, protector, permutating, parantoptic, vibrating guard, compound lever, defiance, magnetic, duplex, detent, holdfast, drill-proof,* are among the names given by patentees to locks intended in one way or other to defy burglars. The manufacture of locks and keys forms a large and important branch of industry in this country, chiefly in the New England States.

Imp. duty: brass, 35 per cent; copper, 45 per cent; wood and iron, 35 per cent; wood and steel, 45 per cent.

Lock, the parts of a canal included between two flood-gates, by means of which a vessel is transferred from a higher to a lower level, or from a lower to a higher. The term is also applied to the contrivance by which vessels are maintained at the level of high tide in harbors exposed to variations of level. — A tuft or ringlet of hair; a tuft of wool, or other like substance. See GUNLOCK.

Lock-Chamber, the space on a canal between two lock-gates.

Locker, a small fixed chest or closet to stow anything away in on board ship. — In England, a custom-house officer of the water-side.

Locket, a small neck ornament worn by a lady, to keep a lock of hair or small miniature or other memento in.

Lock-Gate, the entrance into a lock-chamber on a canal, for the admission, etc., of boats or vessels.

Lock-Maker, a constructor of patent or ordinary locks.

Lock-Saw. See SAW.

Locksmith, a fixer and repairer of locks, who usually combines with it the business of bell-hanger.

Locomotive. See STEAM-CARRIAGE.

Locust, a predatory insect, the *Gryllus migratorius,* which in many countries commits great devastation on crops, devouring every green herb that it comes across. In Africa locusts are largely consumed in many districts for food, either roasted, or pounded and baked into bread. They are also salted.

Locust-Beans, a name for the sweet pods of the carob-tree. See CAROB-BEAN.

Locust-Tree. The *Robina pseudacacia,* or common *L.*, from the valuable properties of its wood, and the beauty of its foliage and flowers, ranks among the first trees of the American forests. In favorable situations it attains a height of 80 or 90 feet, and sometimes exceeds four feet in diameter; but ordinarily it does not surpass half of these dimensions. On the trunks and large limbs of old trees the bark is very thick and deeply furrowed, but

on young trees, not more than two or three inches in diameter, it is armed with strong, hooked prickles, which disappear altogether as they grow old; and in some varieties they are wanting even when young. It abounds in the country W. of the Alleghanies, as far as Arkansas. It is also plentiful in Canada, but is not found indigenous in the U. States E. of the river Delaware, nor does it grow spontaneously in the maritime parts of the Middle and Southern States, within the distance of 50 to 100 m. from the sea. It is planted, however, for purposes of utility and ornament, from Maine to Georgia.

The wood of the *L.*, which is commonly of a greenish-yellow color, marked with brown veins, is very hard, compact, and susceptible of a brilliant polish. It possesses great strength, with but little elasticity; and its most valuable property is that of resisting decay longer than almost any other species of wood. When newly cut, it weighs 63 pounds 3 ounces to a cubic foot; half dry, 56¼ pounds, and when quite dry, only 48¼ pounds, or, according to others, only 46 pounds. In naval architecture, the timber of the locust is much esteemed by American shipwrights, and enters, with the live oak, the white oak, and the red cedar, into the upper and the lower parts of the frames of vessels, though in very small proportions. It is considered as durable as the live oak and the red cedar, with the advantage of being lighter than the former and stronger than the latter. It is used for trenails in the dockyards of Europe and the U. States, in preference to any other kind of wood; and instead of decaying, it acquires, in time, an extraordinary degree of hardness. In civil architecture, in this country, it enters but little into the composition of houses, on account of its scarcity, and its value in ship-building, and for posts of rural fences, etc. When employed in the construction of houses, it is more particularly applied for the support of the sills, which usually consist of more destructible timber, and which, if they were placed immediately on the ground, would sooner decay. From the hardness of the wood when seasoned, the firmness of the grain, and its lustre when polished, it has been extensively used in cabinet-making, and has been substituted by turners for the boxwood, in many species of light work, such as small domestic wares, toys, etc. It has also been employed by millwrights for cogs, but it is less valuable for this purpose than that of the rock-maple.

Lode, a mining term for a regular vein producing or yielding ore or metal.

Lodgings, rooms which are for hire in a house, and are let either furnished or unfurnished.

Lof, Loof, a Russian weight and dry measure: as a weight in Russia it is 92.17 lbs.; as a measure it ranges in different localities from 1 to 1¾ bushel. It is also called a looper in some districts.

Loft, a storehouse on an elevated story; a room immediately under the roof.

Log, an apparatus used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the *common log*. It is a piece of thin board, forming the quadrant of a circle of about 6 inches radius, and balances by a small plate of lead, nailed on the circular part, so as to swim perpendicularly in the water, with the greater part immersed. The log-line is fastened to the log by means of two legs, one of which is knotted, through a hole at one corner, while the other is attached to a pin, fixed in a hole at the other corner so as to draw out occasionally. The log-line being divided into certain spaces, which are in proportion to an equal number of geographical miles, as a half or quarter minute is to an hour of time, is wound about a reel. The whole is employed to measure the ship's headway in the following manner:—

The reel being held by one man, and the half-minute glass by another, the mate of the watch fixes the pin, and throws the log over the stern, which; swimming perpendicularly, feels an immediate resistance, and is considered as fixed, the line being slackened over the stern to prevent the pin coming out. The knots are measured from a mark on the line, at the distance of 12 or 15 fathoms from the log. The glass is, therefore, turned the instant the mark passes over the stern; and, as soon as the sand in the glass has run out, the line is stopped. The water, then being on the log, dislodges the pin, so that the board, now presenting only its edge to the water, is easily drawn aboard. The number of knots and fathoms which had run off at the expiration of the glass determines the ship's velocity. The half-minute glass, and divisions on the line, should be frequently measured, to determine any variation in either of them, and to make allowance accordingly. If the glass runs 30 seconds, the distance between the knots should be 50 feet. When it runs more or less, it should therefore be corrected by the following analogy: as 30 is to 50, so is the number of seconds of the glass to the distance between the knots upon the line. As the heat or moisture of the weather has often a considerable effect on the glass, so as to make it run slower or faster, it should be frequently tried by the vibration of a pendulum. As many accidents attend a ship during a day's sailing, such as the variableness of winds, the different quantity of sail carried, etc., it will be necessary to heave the log at every alteration, and even if no alteration be perceptible, yet it ought to be constantly heaved. — There is also an ingenious machine for registering long or short distances at sea. A log is fixed to the after part of the keel, and communicates by an air-tube with an index placed in the cabins above. Siemens and Halske have applied their scientific skill to the construction of an *electric log:* an insulated wire leads from the ship to a train of wheel-work contained in an air-tight case, and driven by the vane of the log; the electric action is connected with the wheel-work.

Log-board, two boards shutting together like a book, and divided into several columns, containing the hours of the day and night, the direction of the winds and the course of the ship, with all the material occurrences that happen during the 24 hours, or from noon to noon, together with the latitude by observation From this table the officers work the ship's way, and compile their journals. The whole, being written with chalk, is rubbed out every day at noon.

Log-book, a journal kept on board ship, in which is kept an account of the progress made as deduced from observations of the log. It is posted daily from the *log-board*, where these are first recorded. It also contains the state of the weather, direction of currents, position of rocks or shoals, seeing or speaking other vessels, and, in short, all matters relating to the ship's *place*, not only for present convenience, but as matter of intelligence, or of evidence in case of future inquiry. The course and distance run, computed from the log-book, termed by seamen *dead-reckoning*, furnishes an approximate estimate of the ship's position, which is necessarily used until an opportunity is afforded of taking observations of longitude and latitude, or of approaching land.

Logansport, Crawfordsville, and Southwestern R.R. runs from Logansport to Rockville, Ind., 93 m. This Co., whose offices are at Terre Haute, Ind., was organized in 1867, and the road was opened in 1872. It operates, under lease from the Evansville and Terre Haute R.R. Co., the branch from Terre Haute to Rockville, 23 m. Capital stock, $1,500,000. Funded debt, $2,000,000, consisting of: 1st mortgage, 30-year bonds, due August 1, 1900, interest 8%; 2d mortgage, 30-year bonds, due January 1, 1903, interest 8%. The property is in the hands of a receiver.

Logs, rough timber, the tree cut only in lengths, usually, in trade, understood to be saw-logs. To ascertain the dutiable value of logs cut in the province of New Brunswick and imported into the U. States, the stumpage is to be taken at the place where the same are cut, and adding thereto the cost of cutting and hauling to the bank of the river, and the expenses of scaling and marking the same; and the importation is complete when the logs are put in boom. — *T. McElrath.*

Logwood [Fr. *bois de campèche;* Ger. *Blauholz;* It. *campeggio;* Sp. *pálo de campeche*], a dyewood obtained from the *Hæmatoxylon campechianum*, a tree which grows in Campeachy and the West Indies, especially the former, from whence the finest wood is procured. It is hard, heavy, of a deep orange-color, a sweetish astringent taste, and peculiar odor; and is brought to us in large blocks or billets, which were formerly reduced to chips by machinery, but are now ground to powder, in which state the infusion is more readily obtained than from the chips. *L.* is extensively employed for compound colors. By the use of iron, alum, and other substances, *L.* may be made instrumental in dyeing bright and dark red, purple, violet, lilac, etc., in various degrees of intensity; its chief

use, however, is for blacks, and certain shades of gray. With proper mordants the colors obtained from the *L.* are rendered permanent. An extract of *L.* is also used in medicine. *Imp.* free.

Fig. 324.—LOGWOOD.

Loher [Ger.], a tanner.

Lo-kao Green. See DYEING (Green Colors).

Lombard, a term anciently used in England for a banker or money-lender. The name is derived from the Italian merchants, the great usurers or money-lenders of the Middle Ages, principally from the cities of Lombardy, who are said to have settled in London in the middle of the 13th century, and to have taken up their residence in a street in the city which still bears their name. Lombard usurers were sent to England by Pope Gregory IX. to lend money to convents, communities, and private persons, who were not able to pay down the tenths which were collected throughout the kingdom with great rigor that year, 13 Henry III., 1229. They had offices in Lombard Street, which great banking street is called after them to this day. Their usurious transactions caused their expulsion from the kingdom in the reign of Elizabeth.

London. See GREAT BRITAIN.

London Board. See BRISTOL BOARD.

Londonderry. See GREAT BRITAIN.

Long-Beard, a name for New Orleans moss.

Long-Boat, a large and strong boat, formerly the largest carried by a ship; but it has now generally given place to the launch.

Long-Bow, an archery bow for shooting.

Long Cloth, a peculiar kind of fine calico or cotton fabric, which is made milled and plain.

Long Dozen, thirteen articles to the dozen.

Long Hundred, six score, or 120.

Long Island Insurance Co., a fire-insurance Co., located in Brooklyn, N. Y., organized in 1833. *Statement,* Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $252,589.52; risks in force, $17,142,595; premiums, $88,464; premiums received since the organization of the Co., $2,632,-479; losses paid, $913,833; cash dividends paid to stockholders, $1,279,259.37.

Long Island R.R. runs from Long Island City to Greenport, N. Y., 94.88 m. Branches, from Mineola to Hempstead; Mineola to Locust Valley; Hicksville to Northport; and Mannor to Sag Harbor, 63.06 m. Lines leased: Brooklyn and Jamaica R.R.; Flushing, North Shore, and Central R.R. (main line and branches); Newton and Flushing R.R.; New York and Flushing R.R.; New York and Rockaway R.R.; Smithtown and Port Jefferson R.R.; and Southern R.R. (main line and branches), 164.94 m.; total length of lines operated, 322.88 m. This Co., whose offices are at Long Island City, was organized in 1834, and the main line was opened in 1844. The whole property of the Co. was placed in the hands of a receiver in 1877. The financial condition of the Long Island R.R. Co. in 1879 was as follows: Capital stock, $3,260,600; funded debt, $1,881,750; floating debt, $1,157,861; total liabilities, $6,300,-211. Cost of property, $6,242,698.

Longitude. See LATITUDE.

Long-Measure, the measure of length of a country.

Long Price, price including the duties.

Long-Primer, a printing-type intermediate in size between small-pica and bourgeois.

Longshoreman, any laborer employed about the wharves and docks in loading or unloading the cargoes of vessels.

Long-Tom, a cradle used for washing out gold by miners in the gold-fields.

Lontar Sugar, sugar made from the sap of the palmyra or lontar-palm (*Borassus raphis flabelliformis*).

Loobs, tin slime or sludge containing ore.

Loo-Choo Islands, a group consisting of about 36 islands in the North Pacific Ocean, between Japan and Formosa. They lie between N. lat. 24° and 28° 40′, and E. lon. 127° and 129°. They are small and insignificant, with the exception of Great Loo-Choo, which extends about 60 miles in a northeasterly direction, and has an average breadth of about 10 or 12 miles. This island is entirely encircled by coral reefs, which, however, do not appear above water. Along its centre runs a chain of hills, covered for the most part by forests of pine, and broken at intervals by abrupt crags that bear seeming traces of volcanic action. Their slopes in many parts are covered with terraced gardens and fields of grain, and are watered by streams led in artificial channels. The valleys are well watered, fruitful, and covered with a luxuriant vegetation. The villages are almost completely hidden among groves of bananas, bamboos, banyans, and pines. Rows of trees overarch the roads, line the streets of the chief towns, and form a screen in front of the houses. There are large rich fields of rice, intermingled with crops of sugar-cane, wheat, millet, sweet potatoes, plums, oranges, cotton, and tobacco. The dress, customs, and especially the language, of the Loo-Chooans, indicate a Japanese origin. Suspicious of strangers, they are, nevertheless, gentle and hospitable. They are diminutive in stature, and in complexion resemble the Chinese. A great part of the industrial population is engaged in weaving the grass-cloth that forms the ordinary garment, and in turning wooden implements and covering them with lacquer. There are also manufactured tobacco, sugar, and small quantities of salt. Saki, a strong intoxicating liquor, is distilled from rice. All the processes of agriculture, and especially that of irrigation, are carried on with great success. The entire trade of the island is with Japan, and consists chiefly of sugar, saki, and grass-cloth. The government of Loo-Choo seems to consist of an oligarchy of *literati* subject to Japan. Pop. 166,789. ***Napa,*** or *Napa-keung,* the principal seaport, is sit-

uated in lat. 26° 13′ N., lon. 127° 36′ E., on a small island in a bay near the S. W. point of the island. It is a town of considerable size. The harbor is secure; it was open to American vessels by convention concluded in 1854. The government of Japan having virtually disclaimed any jurisdiction whatever over the Loo-Choo Islands, a separate compact was entered into between the U. States and the kingdom of Loo-Choo.

Loodh, a name in Bengal for the *Symplocus racemosa* or *laurina*, celebrated for its bark, which forms a mordant for red dyes.

Looking-Glass, a commercial name for small glass mirrors, usually but not necessarily of plate glass. See GLASS, SILVERING, SPECULUM.

Imp. duty: plates (see GLASS); metal or wood frames, gilt or not, 35 per cent.

Lool, a vessel used in mining districts to receive the washings of the ore.

Loom, one of the most useful of machines, employed by weavers for crossing and weaving threads. In the oldest Egyptian pictures and sculptures the principle of its action is discernible, however imperfect the mode of application.

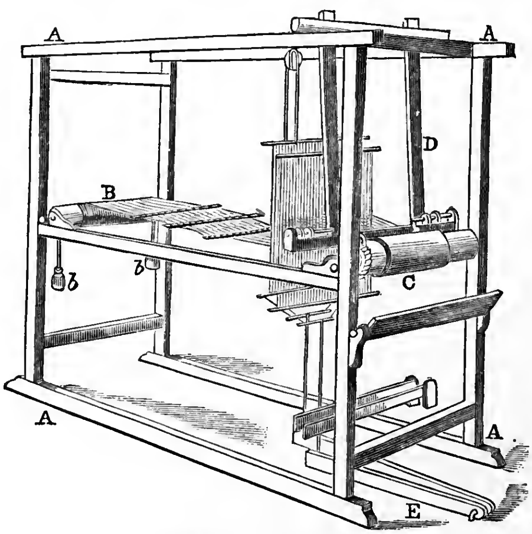

Fig. 325. — HAND-LOOM.

The *hand-loom* in its simplest form is represented in Fig. 325, in which A A is the frame of the loom, and is of no other use than to hold the working-parts in their proper position. At each end of the frame two rollers are placed, B C, so that they will readily turn on their axes; and from one to the other the threads of the warp are attached, and kept tight by the weights *b*, *b*. The warp-threads are wound round the roller B, which is called the *beam* or *yarn-roll*, only as much of each thread being left unwound as will reach to the other roller, C, which is the *cloth-beam*, to which the ends are fastened, and upon which the cloth is wound as it is woven. The warp so stretched is seen in Fig. 326. The next step is to di-

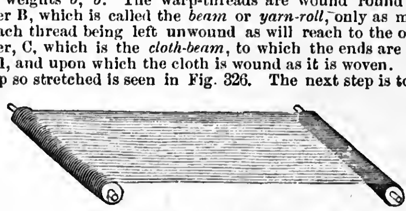

Fig. 326. — WARP.

vide the warp-thread into two equal sets by raising up every alternate one, and inserting between them a smooth rod of wood to prevent them entangling or returning to their former position. This separation takes place before the final fixing of the ends of the threads to the *cloth-beam*, because, previous to that, each thread must be passed through a small loop in a perpendicular thread called the heald, which hangs down from the rod, A, in Fig. 327 (in which only six heald-threads and six warp-threads are shown, for the sake of rendering the action clearer). There are always two sets of healds in the simplest form of loom, often many more; and in the case of plain weav-

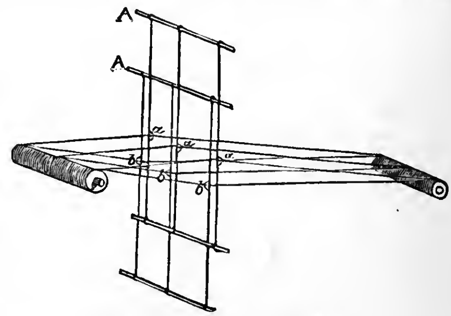

Fig. 327. — HEALD, OR HARNESS.

ing, the threads of the warp are divided alternately by the loops of each heald, so that if one heald is raised, it lifts every alternate thread of the warp, and if the other is depressed, it pulls down the opposite set of threads; thus, in Fig. 327, the three threads of the warp are seen to pass through the three upraised threads of one heald by the loops *a*, *a*, *a*, and the three remaining threads of the warp pass through the depressed healds by their loops *b*, *b*, *b*; the united action of the two healds opens a space between the two sets of warp-threads similar to that shown in Fig. 328. This space is called the

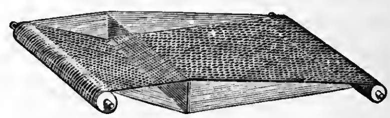

Fig. 328. — SHED.

shed, and through it is thrown the shuttle (see SHUTTLE) which carries the thread of the weft; when the weft has passed through, the healds are reversed, and the lower warp-threads now become the upper ones. The threads, after each intersection, are driven up tight by the reed, which is a narrow frame with transverse wires set sufficiently far apart for a single thread of warp to pass through each; it hangs to the frame called the batten, Fig. 325, D. The movement of the batten is produced by the hand of the weaver, whilst that of the healds is readily effected by the treadles E. Many improvements have been made in this the simplest form of loom, but the chief has been in replacing the weaver's hand in the necessary operation of throwing the shuttle by a mechanical arrangement. The *harness* in a loom is that portion of the apparatus by which the warp-threads are moved to make the decussation, forming the shed in which the shuttle travels and leaves the weft-thread.

Machine Loom. So long as the fabric is plain, like calico or linen, the hand-loom will suffice to weave it; but if it is figured an additional apparatus is necessary. In this case the warp-threads, instead of being raised alternately, are raised two or more together, then one only, then two or more, according to the exigencies of the pattern. Hence two healds will not suffice; there must be other mechanism for raising the warp-threads in some prescribed order. A *draw-boy* was at one time employed for this purpose. Many healds, depending in number on the pattern, were so arranged that a boy, by pulling at certain strings, could raise any heald or group of warp-threads. But as the excellence of the work depended on the right group being pulled up at the right time, and as a boy could not always be relied upon here, an improvement called the *draw-loom* was devised, which insured something like mechanical precision in this work. A more effective and beautiful substitute for the draw-loom is the *Jacquard Loom* or machine, invented towards the end of the last century, and used for weaving figured goods. In this loom, a chain of perforated cards is made to pass over a drum, and the strings by which the threads of the warp are raised pass over an edge with a wire or leaden weight of small diameter suspended from each. These weights, at each stroke of the loom, are presented to each successive card, and some of them are intercepted by the card while others pass through the holes therein, the latter thus determining which threads of the warp shall be raised. In this way the figure on the card determines the nature of

the figure on the fabric M. Bonelli, an Italian engineer, has recently invented an electric apparatus to work with the Jacquard, under the name of the *Electric Loom*. The design is represented, not by holes in cards, but by alternations of conducting and non-conducting surfaces in metal plates. The plan is scientific and beautiful, but has not yet come much into use.

The *power-loom*, or weaving-loom worked by steam-power, of which Dr. Cartwright was the chief inventor, has the warp-threads horizontal, and wound round a *warp-beam* at one end and a *cloth-beam* at the other: there are also two vertical *healds* (for plain weaving), a *batten* with its *reed* of *dents* to drive up the weft-thread, and a *shuttle-race* along which the *shuttle* travels. All the essential parts are there in principle, as in the hand-loom; the important difference is that the various movements are effected by steam-power, instead of by the hands and feet of the weaver. The raising of the healds to form the shed in the warp, the throwing of the shuttle, the driving up of the weft with the batten, the unwinding from the warp-beam, the winding of the cloth-beam, — all are here the work of steam. There is also a beautiful contrivance for stopping the loom whenever any of the threads break. So completely is the work done by steam, that one girl is able to attend two looms, to perform such minor duties as supplying the shuttles with fresh cops of weft, etc. A power-loom for weaving fabrics of extra width, and a Jacquard machine over it to produce figured patterns, form together a very triumph of modern ingenuity.

Loom-Cards, perforated cards with patterns for Jacquard weavers.

Loom-Dice, a linen cloth for table furniture, usually 54 in. wide, checked or plaited with the dice pattern in the power-loom.

Loop, a folding or doubling of a string, or a noose through which a lace or cord may be run for fastening. — A part of a block of cast-iron melted off for the forge or the hammer.

Loop-Line, a connecting line of railroad, with each end joining the trunk line.

Lop, the cuttings or branches from a tree; thus in a sale of standing timber-trees they are sometimes advertised with their "lop, top, and bark."

Lorcha, a Chinese coasting vessel with a hull of European model and Chinese masting and rigging.

Lorgnette [Fr.], a spy-glass; an opera-glass.

Lorimer, a bridle-cutter; a bit-maker.

Lorient. See FRANCE (Seaports).

Lorillard Fire-Insurance Co., located in New York City, organized in 1871. *Statement*, 1879: Cap. stock paid up in cash, \$300,000; net surplus, \$71,541.29; premiums received since the organization of the Co., \$1,167,749; losses paid, \$500,317; cash dividends paid to stockholders, \$171,000.

Lorry, a coal-truck.

Losh Hide, a hide not dressed in any way, but simply oiled.

Lot, a division; a share; a separate parcel of goods. — An undetermined quantity of goods offered for sale as a single item.

Lotion, a medical preparation, used as an outward application to reduce the heat in an inflamed part, or to stimulate some indolent sore or unhealthy ulcer. Collyriums, or eye-waters, are also included under the name of lotion. Lotions are of various kinds, such as refrigerating, sedative, stimulating, astringent, or evaporating, according to the effect they are employed to produce.

Lottery, a game of hazard, in which, by payment of a small sum, one has the chance of obtaining a considerable prize. The origin of *L.* may be found in the custom inaugurated by the Roman emperor Augustus, of distributing at his feasts sealed pockets (*sortis convivials*), similar in appearance, but containing orders for articles of very different value. In the Middle Ages the same mode was adopted by the Italian merchants in the disposition of their wares. A money *L.*, called the *lotto*, was instituted in Florence in 1530, for the benefit of the state; and in Venice, a half-century later, *L.* existed under public control. From that time many of the European states resorted to *L.* as a means of raising a revenue. The first *L.* was established in France in 1539; in England in 1569; in Würtemberg in 1699; and in Berlin in 1763. They were abolished in England in 1826, in France in 1836, and later in Germany; but State *L.* still exist in several other parts of Europe, especially in Italy and Spain. In the U. States the *L.* was from the earliest settling of the country a familiar means of raising funds; and it must be said that the State *L.* were generally fairly managed, and used for many important and beneficial purposes. But the multiplicity of private *L.*, and the scandalous abuses to which they gave rise, aroused public opinion against the principle itself. In 1833 a society was formed in Pennsylvania, which advocated the suppression of *L.*, and to the efforts of that society may be attributed the acts of most of the States in prohibiting their further establishment, and forbidding the legislature to authorize them. *L.* are still permitted in Kentucky, and a *L.* company was chartered in 1868 in Louisiana with exclusive privilege of selling *L.* tickets for 25 years; but in nearly all the other States heavy penalties are imposed on persons attempting to establish *L.* or selling *L.* tickets.

Louis, Louis d'Or, an old name still sometimes given to the French gold coin of 20 francs. It was so called from having been first struck under Louis XIII. in 1641.

Louisiana, one of the southern U. States, lies between lat. 28° 59′ N. and lon. 88° 40′ and 94° 10′ W. It is bounded N. by Arkansas and Mississippi, E. by Mississippi and the Gulf of Mexico, S. by the Gulf of Mexico, and W. by Texas; its extreme length from E. to W. being 292 m., with an average breadth of 250 m.; area 41,346 sq. m., or 26,461,440 acres. It is divided into 57 counties, called parishes. The principal places in *L.* are New Orleans (the capital and commercial emporium of the State), Baton Rouge, Shreveport, Donaldsonville, Algiers, Jefferson, Carrollton, Plaquemine, Nachitoches, Alexandria, and Homer. Population in 1870, 726,915, of which 362,065 were white, and 364,210 colored. Pop. in 1880, about 775,000.

The surface of *L.*, never more than 200 feet above the level of the Gulf, is in many places so low that extensive districts, especially in the S., are submerged during the stages of high water in the rivers. W. of the Mississippi basin the land rises in hills towards the N. W. part of the State, broken, however, by the marshes along the several arms of the Red River The delta of the Mississippi, including both the river Atchafalaya and the main stream, and embracing about one fourth of the area of the State, is nowhere more than 10 feet above the sea, and is subject through its entire extent to annual inundations. The coast-line of 1,256 m. is indented with numerous bays and inlets, the principal of which are Barrataria, Timbalier, Caillou, Atchafalaya, Côte-Blanche, and Vermilion bays; but owing to their insufficient depth, it has few good harbors. There is, however, a good roadstead on the W. side of the Chandeleur Islands. Besides the latter, sundry other islands are scattered along the coast. These are more elevated than the main-land, being from 30 to 100 feet above the sea-level, and are covered with dense forests abounding in deer and other game. The Mississippi River forms the boundary of the State for a considerable distance, and in its lower part runs wholly within the

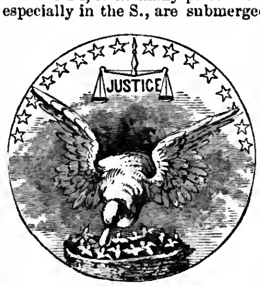

Fig. 329. — SEAL OF LOUISIANA.

State, and enters the Gulf of Mexico by several channels. It is navigable for vessels of the largest size. Red River enters the State near the N. W. corner, and passes through in a S E. direction, discharging a vast amount of water into the Mississippi, 236 m. above New Orleans. The Washita runs in a S. direction in the N. part of the State, and enters Red River a little above its junction with the Mississippi. Bayou La Fourche and Atchafalaya are large outlets of the Mississippi. The other rivers and streams are the Black, Tensau, Sabine, Calcasieu, Mermanteau, Vermilion, Teche, Pearl, Amite, Iberville, etc. Situated S. of lat. 33° N., the temperature of *L.* rarely sinks below the freezing-point, and as all parts of the State are daily fanned by the refreshing breezes from the Gulf, the temperature of midsummer seldom rises as high as in places more remote from the sea in the upper valleys of the Mississippi and its tributaries. The mean temperature in all parts of the State is about 82° F.; that of winter 50° in the N. part, and 55° on the parallel of New Orleans. The average temperature for the year is about 70° in the southern, and 65° in the northern portions of the State. The summers are long, but seldom or never oppressive, and the nights are always cool and refreshing. In the neighborhood of swamps and marshes miasmatic influences prevail during the fall of the year, occasioned by the evaporation of the stagnant waters left by the annual overflow of the rivers, and producing the various types of fever incident to such localities. The uplands, however, are remarkably salubrious, and many invalids from the North, especially those predisposed to consumption, derive great benefit from the mild and healthy atmosphere of these regions. The yellow fever, which seems so identified with New Orleans and the other towns along the river, always makes its appearance first in some of the W. India islands, or at some point along the coast of Mexico or Central America, and hence may be considered more as an imported disease than as having its origin here, though the natural lowness and moisture of certain localities undoubtedly favor its dissemination. When not visited by an epidemic, New Orleans is as healthy as any city of similar size, and there is little doubt that proper sanitary measures, and the complete draining of the marshes in the vicinity, will render this city as healthful as Philadelphia, New York, or Boston, at all seasons of the year, as it is during the winter and spring. In the N. and W. parts, the soil of *L.* is frequently thin and sandy, and covered with pine forests, but even here it is easily brought to a high state of fertility by the application of marl and gypsum, which are found in great abundance and of the best quality in this portion of the State. Every part of *L.* is traversed by numerous streams, bordered by valleys of greater or less width, always exceedingly fertile. The soil of the prairies is rich and productive, covered at all seasons with indigenous grasses, supporting vast herds of cattle, sheep, horses, and mules, which are raised here with as little trouble and expense as in any other part of the U. States. The delta of the Mississippi is a sedimentary accretion many hundred feet in depth. It is about 200 m. in length, with an average breadth of 60 or 70 m., containing an area of from 12,000 to 14,000 sq. m., being about as large as the whole valley of the Nile from the cataract of Syene to the Mediterranean. It is also equal in fertility to that far-famed valley, and will render bountiful returns to its cultivators for generations, without manure, and without dependence upon the overflowing of the river by which it was formed. The husbandmen of the Nile rejoice in the inundation of that river, because the clouds furnish no moisture to the thirsty soil; while the planters of the valley of the Mississippi resist the inundation of their lands, and confine the river to its channel, because the rains are abundant for the most successful agriculture. It may be safely stated with regard to *L.*, that all, or nearly all, its marshy and swamp lands are capable of reclamation, and that when so reclaimed, there will be few, if any, States in the Union that will contain an equally large proportion of the very richest land, or any so admirably adapted to the production of some of the most valuable staples that enter into the commerce of the country. The vegetable products of *L.* comprise the walnut, oak, ash, sassafras, hickory, poplar, locust, mulberry, magnolia, cottonwood, buckeye, papaw, cypress, pine, elm, maple, willow, hackberry, pecan, dogwood, and persimmon, among its forest trees; while the peach, quince, plum, and fig, with the apple in the N., are the principal fruits. The wild cane flourishes here, attaining to a height of 30 feet. The great staples of *L.* are cotton, sugar, rice, and Indian corn. In 1878 *L.* was fourth among the States in the production of cotton, with a crop of 250,000,000 lbs. This State produces almost all the sugar made in the U. States; and the crop for 1878, which was the largest made since the war, was 250,094,000 lbs., or 208,571 hogsheads of sugar and 13,524,000 gallons of molasses. The sugar estates are generally located on the Mississippi River, beginning some 60 m. below New Orleans and going about 200 m. above. There are also many estates in the parishes to the W. of the river; in fact, the greater portion of the State S. of the Red River and W. of the Mississippi is good sugar land. Yet of this immense area only 150,000 acres are planted in cane. The amount of the other agricultural products and live-stock is given in this work under the name of each of the principal crops and animals. The number of acres of improved farm land, as reported by the last census, was 2,045,640; number of farmers, 28,481; cash value of farms, $68,215,421; of farming implements and machinery, $7,159,333; estimated value of farm productions, $52,006,622; value of orchard products, $142,129; of produce of market gardens, $176,969; of forest products, $92,596; of home manufactures, $64,416; of live-stock, $15,929,188. The industry of *L.* has hitherto been directed to agriculture and commerce, rather than to manufactures, though there is no reason why that class of enterprise should not be profitably conducted. The commerce of the State, both foreign and domestic, has been very extensive, and its admirable system of internal navigation will yet place the State in the front rank of the world's commercial communities. To the direct navigation of the Mississippi, extending northward to the Falls of St. Anthony, some 2,000 m., its greatest tributary, the Missouri, adds 3,000 m., stretching up to the Rocky Mountains, the Ohio and its tributaries 2,500 m. more, reaching the heart of the Alleghanies, and tapping the rim of the northern lake basin. To these aggregates, adding the numerous large affluents further S., with their branches, we obtain a sum total approaching, in round numbers, 17,000 m., pouring the products of 14 States into the magazines of New Orleans for foreign exportation. At the time of the last census the number of manufacturing establishments was 2,557, having 887 steam-engines of 24,924 horse-power, and 23 water-wheels of 142 horse-power; number of hands employed, 30,071; capital invested, $18,313,974; wages paid, $4,593,470; value of materials, $12,412,023; of products, $24,161,905. Fully one third of what is now the State of *L.* was originally in a condition of swamp or inundated land. The system of levees was commenced prior to 1727, by the early French settlers, and in 1735 extended from English Bend, 12 m. below, to 30 m. above New Orleans, on both sides of the river. They were constructed by the planters, each building a levee the length of his river front. In 1752 they extended 20 m. below the city, and continued to advance slowly on the Mississippi, on the Bayou La Fourche, the Bayou Plaquemine, and on the Atchafalaya and Red rivers, and in 1844 were nearly continuous on the W. bank from New Orleans to the mouth of the Arkansas River; and since the passage of certain acts of Congress granting swampy and overflowed lands to the State to aid in their reclamation and improvement, have been extended, with interruptions, to Cape Girardeau in the State of Missouri; and on the E. bank from the upper part of Coahoma Co. to the lower part of Issaquena Co., in Mississippi, from Vicksburg to Baton Rouge, and from the latter city nearly to Point La Hache. This State, not realizing any special need of artificial routes in the face of such an immense water-communication, has not been engaged extensively in railroad building. Yet, in 1879 there were 466 m. of railroads in operation. The names of the lines, their total length, and their extent in *L.*, are shown in the following table: —

Companies.	Total length of line.	Total length of line in Louisiana.
	M.	M.
1. Baton Rouge, Grosse Tête, and Opelousas	28.00	28.00
2. Chicago, St. Louis, and New Orleans	571.66	93.00
3. Clinton and Port Hudson	21.50	21.50
4. Louisiana and Texas (Morgan's)	97 25	97.25
5. New Orleans and Carrollton	8.00	8.00
6. New Orleans and Mobile	141 00	33.00
7. New Orleans, Mobile, and Texas	65.00	65.00
8 Texas and Pacific	443.86	17 71
9. Vicksburg, Shreveport, and Texas.	73.00	73.00
10. Vidalia and Western (3 feet)	10.00	10.00
11. West Feliciana	27.50	20 00

In 1879 *L.* had 7 national banks in operation, whose paid-in capital was $3,475,000. There were, besides, 24 State banks, savings-banks, and private bankers, whose aggregate capital was $4,589,905. The State debts amounted to $12,136,166.24, of which $11,730,073.69 were consols; and $406,092.55 the fundable portion of other debts still outstanding. The assessed value of taxable property was $177,000,000; and the tax per capita, $2.25.

L. has two customs districts, Teche, a port of entry of Brashear City; and New Orleans, the great commercial city and seaport of the South. See New Orleans.

Louisville. See Kentucky.

Louisville, Cincinnati, and Lexington R.R. runs from Louisville to Lexington, Ky., 93.70 m.; Junction to Newport, Ky., 81 m.; leased lines, 38.79 m.; total length of lines operated, 213.49 m. In 1869 the Louisville and Frankfort R.R. Co. and the Lexington and Frankfort R.R. Co. were consolidated under the name of L., C., & L. R.R.

Co.; a receiver was appointed to that new Co. in 1874, and the property was sold to its present owners on Oct. 1, 1877. Cap. stock, common, $496,011.58; preferred, $1,374,762.08; funded debt, $3,375,300. Cost of property to Co., $5,772,640.32. The offices of the Co. are at Louisville.

Louisville and Nashville R.R. Co. runs from Louisville, Ky., to Nashville, Tenn., 185 m.; branches, 476.14 m.; leased line (Nashville and Decatur R.R.), 132.30 m.; controlled line (South and North Alabama R.R.), 190 m.; total length of lines operated, 973.44 m. This Co., whose principal office is at Louisville, was chartered in 1850, and the main line was opened in Nov., 1859. In 1879, the general balances of accounts of the Co. were as follows:—

	Dollars.
Capital Stock	9,007,819
Funded Debt	17,440,720
Bills Payable	1,386,098
Dues and Accounts	878,755
Interest, July and August	162,706
Dividend, August 10	135,117
Profit and Loss	3,304,765
Total Liabilities	32,315,980
Road and Outfit	24,066,920
Cecilian Branch	583,985
Gold Bonds	714,016
Real Estate, etc	959,455
Materials and Fuel	369,457
Stocks and Bonds	3,853,308
S. & N. Alabama R.R. Co	575,875
N. & D. R.R. Co	389,025
Accounts and Cash	803,939
Total Property and Assets	32,315,980

Louisville, New Albany, and Chicago Railway runs from New Albany to Michigan City, Indiana, 288.26 m. The principal office is at Indianapolis. This road was opened in 1852, and was sold under foreclosure in December, 1872, to the 1st mortgage bondholders of the Louisville, New Albany, and Chicago R.R. Co. for the sum of $3,000,000, and was reorganized under its present title.

Love-Apple. See TOMATO.

Love-Ribbon, a thin gauze ribbon.

Lower Case, in letter-press printing, an oblong case of about a yard long, and half a yard broad. It is composed of about 50 boxes of different sizes, in which are separately deposited all the letters of the alphabet, as also the points, double letters, and, in some offices, the figures. The case containing the capital letters, small capitals, and accents, is placed on a frame directly above, and called, in contradistinction to the other, the Upper Case.

Lowering, among distillers, a term employed to express the debasing the strength of any spirituous liquor by mixing water with it. The standard and marketable price of these liquors is fixed in regard to a certain strength in them called *proof;* or, that strength which makes them, when shaken in a phial or poured from on high into a glass, retain for some time a froth or crown of bubbles. In this state spirits consist of about half pure, or totally inflammable spirits, and half water; and if any foreign or home spirit be exposed for sale and found to have that proof wanting, scarcely anybody will buy it until it has been distilled again and brought to the proper strength; and if it be above that strength the proprietor usually adds water to bring it down to the standard. There is another kind of lowering among the retailers of spirituous liquors to the vulgar, by reducing it under the standard proof. Whoever has the art of doing this without destroying the bubble-proof, which is easily done by means of some addition which gives a greater tenacity to the parts of the spirits, will deceive all who judge by this proof alone. In this case, the best way to judge of liquors is by the eye and the tongue, and especially by the instrument called the hydrometer.

Low-Pressure, a steam-pressure of not over 50 pounds to the square inch. A *Low-pressure Engine* is, in England, an engine where the steam is drawn off into a condenser.

Low-water Mark, the lowest state of the tide after the ebb is completed.

Low Wines, the weak spirit remaining after the first distillation of alcohol.

Loxa Bark, same as *crown bark*. See CINCHONA.

Lozenge, a small confection of aromatized sugar and starch, cut into any shape. Also a medicinal preparation made up into a small cake, to be gradually dissolved in the mouth. Sugar, gum, and starch are the usual inert parts of lozenges; and minute quantities of active substances are added, according to the purposes for which they are intended: such as ipecacuanha or squills, for pectoral *L.*; extract of poppies or opium, for sedative *L.*; cayenne pepper as a stimulant; oil of peppermint as an antispasmodic, etc.

Lubber, a contemptuous name given by sailors to those who know not the duty of a seaman. *Lubber's Hole* is the vacant space between the head of a lower mast and the edge of the top. It is so termed from a supposition that a lubber, not caring to trust himself up the futtock shrouds, will prefer that way of getting into the top.

Lubeck, one of the free cities of Germany (see HANSE TOWNS), and the capital of a small territory, is situated on a gentle ridge between the rivers Trave and Wakenitz, 10 m. from the mouth of the former at Travemünde, and 36 m. N. E. of Hamburg, in lat. 53° 51′ N., lon. 10° 41′ E. Area of state, 109 sq. m. The city proper had 39,743, and the rural districts, composed of scattered portions of territory surrounded by Prussia and Mecklenburg, 12,415 inhabitants at the date of the last census. The government is vested in a Senate and House of Burgesses.

Although by no means so important as formerly, *L.* may be still considered a thriving town. Its direct trade is chiefly with Russia, Sweden, Norway, Denmark, and Great Britain. It has also an extensive transit trade, chiefly with Hamburg. Regular steam communication is kept up with Copenhagen, Stockholm, and St. Petersburg. Vessels drawing not more than nine feet of water can come up to the town, but larger vessels load and unload by means of lighters at Travemünde, between which and *L.* small steamers are constantly plying. The chief exports are corn, cattle, wool, iron, and timber; imports, wines, silks, cottons, hardware, colonial products, and dyestuffs. The manufactures are numerous, but not large or important. Among the chief are woollen, linen, cotton, and silk goods; tobacco, soap, paper, playing-cards, musical instruments, hats, and iron, copper, and brass wares. *L.* possessed, in 1880, 46 sea-going vessels, of 8,914 tons, including 22 steamers of 4,409 tons. In the year 1879 there entered the port of *L.* 2,643 vessels, of 451,000 tons, and there cleared 2,088 vessels, of 441,300 tons. The U. States has no direct trade with *L.*, such of its staples as reach that market being chiefly supplied from Hamburg.

Lubrication, the oiling of the joints and bearings of machinery, axles, etc., in order to diminish friction. The substance used is called *lubricant,* while the name *lubricator* is applied to the oil-cup or other contrivance for supplying the lubricant (oil or grease) to rubbing surfaces.

It has always been found difficult to lubricate machinery exposed to a high temperature, as most of the materials used for such purposes decompose and become viscid, thus interfering considerably with the motion that they ought to assist. Hitherto, finely pulverized plumbago has been the most

effective lubricant under such circumstances, as heat has no effect whatever upon the plumbago itself, though it so far changes the relations of the metals to it as to interfere with its usefulness. A very good lubricant for bullets consists of 8 parts bayberry-wax and 1 part plumbago. Japan wax is also frequently, but not so effectively, used with plumbago. There is a very large number of patents for lubricants and lubricators.

Lucerne, an artificial fodder-grass, the *Medicago sativa.*

Lucet, a lady's lace-loom, made of bone, ivory, or wood.

Lucifer-Match. See MATCH.

Luff, the order from the pilot to the steersman to put the helm toward the lee side of the ship, in order to make the ship sail nearer the direction of the wind. Hence, luff round, or luff a-lee, is the excess of this movement, by which it is intended to throw the ship's head up in the wind in order to tack her. A ship is also said to *spring her luff* when she yields to the effort of the helm by sailing nearer to the line of the wind than she had done before. *Luff Tackle*, a name given by sailors to any large tackle that is not destined for any particular place, but may be variously employed as occasion requires. It is generally somewhat larger than the jigger tackle, although smaller than those which serve to hoist the heavier materials into and out of the vessel; which latter are the main and fore-tackles, the stay and quarter-tackles, and so forth.

Lug, the projecting slip of a mould or flask, used in casting operations. — A classification of American tobacco.

Luggage, the name generally used in England for *baggage*.

Lugger, a vessel with two or three masts, up and down which lug-sails are made to traverse, so that they may be readily set or taken in without going aloft.

Lug-Sail, a square sail, hoisted occasionally on the mast of a boat or small vessel, upon a yard which hangs nearly at right angles with the mast. These sails are more particularly used in the barcalongas navigated by the Spaniards in the Mediterranean.

Lumber, timber sawed into merchantable forms. See WOOD.

Lumber Merchant, one who sells sawed timber, — planks, boards, scantlings, pickets, staves, hoops, laths, shingles, and such other like articles as are usually kept for sale in lumber-yards.

Lumber-Trade, dealing in saw-logs, rafts of round and square timber, and masts, spars, and heavy timber generally; also, the business or trade of a lumber merchant. See WOOD.

Lump, a small mass of matter of no definite shape. — A mass of things blended or thrown together without order or distinction. — A bloom or loop of malleable iron.

Lump Coal, the largest size in which coal is delivered from the mines, the lumps averaging from 10 to 20 inches cube.

Lumper, one who furnishes ballast for ships.

Lump-Sugar, broken sugar obtained from the clarified loaves, usually in bits about the size of a walnut; put up by the refiners in barrels.

Lunar Caustic, a term applied to nitrate of silver, cast in sticks, and used by surgeons for cauterizing purposes. A great improvement has been lately made in its manufacture by melting with it a certain proportion of chloride of silver, which has the effect of rendering the stick flexible instead of brittle.

Lunel, a luscious, fine, spirituous, and sweet muscadine wine, produced in the department of Herault, France.

Lunette, the rim of a watch-glass. — A small opening in the roof of a house. — An eye-glass. — A blinder for the eyes of an intractable horse.

Luppe [Ger.], a microscope or magnifying-glass.

Lupulin, the small granules or yellowish powder found on the surface of hops, obtained by threshing and sifting the hops.

Lurch, the sudden heavy rolling of a vessel at sea to one side.

Lustered, a term used in the fur-trade for inferior furs tipped with coloring substances, so as to imitate those of a better quality.

Lustering, a polish. — The brightening of metal in the crucible at the moment of reaching its point of purity.

Luster-Ware, a kind of stone-ware which presents a very gay appearance in virtue of certain processes which it undergoes. The ware itself is carefully made and baked, almost as much so as porcelain; and the *L.* is produced by means of metallic oxides. Thus platinum will produce a *L.* like that of polished steel; while gold and silver will produce *L.* like those of the two precious metals. The metals are prepared and ground into a kind of paint, which is applied to the ware by means of camel-hair brushes. The heat of an oven brings out the *L.* with the proper tint and brilliancy. Silver and platinum *L.* succeed best on white ware, gold on colored ware. Iron and copper *L.* can also be produced. A beautiful iridescent *L.* results from the use of chloride of silver, combined in a peculiar way with other substances. The kind of ware to which *L.* is applied is made of a mixture of clay, flint, china-stone, and felspar; and a peculiar glaze interposes between it and the *L.*

Luster, or **Lustre**. — A lady's dress-goods with a cotton chain, woollen filling, and highly finished surface.

Lustre [Fr.], a sconce, or chandelier, ornamented with pendent drops of cut-glass.

Lustring, a shining or glossy kind of silk.

Lustrous, having a shining or glossy appearance, like silk.

Lute, a stringed musical instrument, long since superseded by the harp and the guitar, but for centuries very fashionable in Europe. It somewhat resembles in shape the section of a pear, and is played as the guitar.

Lute, a substance used for making vessels or apparatus air-tight, by closing the apertures of their joints, or for coating, so as to enable them to bear a higher temperature, or for repairing a fracture. Clay is the basis of many *L.*; whence the term, from *lutum*, clay. Among the principal *L.* are *Stowerbridge clay*, in fine powder, made into a paste with water; *Windsor loam*, a natural mixture of clay and sand; *Willis's L.*, a thin paste made of a solution of borax, in boiling water, with slacked lime. Mixtures of borax and clay also form useful *L.* What is called *fat L.* is a mixture of pipe-clay with drying linseed-oil. Caustic lime furnishes, by admixture with other bodies, a variety of *L.* A mixture of lime and white of egg, or glue, forms a powerful cement. *Iron cement* is useful for making joints tight, as is also white lead ground up with oil and spread on strips of cloth. Among the other substances used as *L.* may be mentioned moistened bladder, paste, and paper; paper prepared with a mixture of wax and turpentine, linseed-meal, and caoutchouc. The last-named substance is in extensive use for making chemical joints or elastic con-

nectors, getting rid of that rigidity which, in a complicated arrangement of apparatus, is so liable to lead to accident. The following *L.* will enable glass vessels to sustain an incredible degree of heat: Take fragments of porcelain, pulverize, and sift them well, and add an equal quantity of fine clay, previously softened with as much of a saturated solution of muriate of soda as is requisite to give

Fig. 330. — LYCOPODIUM.

the whole a proper consistence. Apply a thin and uniform coat of this composition to the glass vessels, and allow it to dry slowly before they are put into the fire.

Luteoline, a yellow dye obtained from the weld (*Reseda luteola*).

Lutestring, an incorrect spelling for lustring.

Ly, a Chinese land-measure, about the third part of an inch.

Lyceum, a theatre; a grammar-school; a literary institution.

Lycopodium, the club-moss, a genus of cryptogamous evergreen plants. — The seeds or spores of one species, *L. clavatum* (Fig. 330), are very minute, and resemble an impalpable yellow powder, which is used in pharmacy to prevent the adhesion of pills; in medicine, for application to excoriated surfaces; for dyeing purposes, to fix the color of woollen cloth; and in theatres, to imitate lightning. This powder, when diffused, is very inflammable, and when a cloud of it is shaken into the air near a flame, it burns with a rapid flash. *L.* is collected to some extent in the U. States, but the greatest part of the *L.* of commerce is imported from Europe.

Lydian-Stone. See TOUCHSTONE.

Lye, Ley, or **Lees**, is a solution of alkaline salts, resulting from various manufacturing processes, especially from Soap Manufactures (which see).

Lynx Skins. The skin of the European *L.* (*Felis lynx*), is of a grayish white, with dark spots. Being very soft, warm, and light, it furnishes a valuable fur for robes and coverings. The skin of the Canada *L.* (*Lynx canadensis*), which is used for the same purposes, has longer hair, the tail shorter and less tufted, and the dark spots less distinct. The Canada *L.*, which is three feet long to the base of the tail, is principally found from Canada to lat. 66° N., to the E. of the Rocky Mountains.

Lyons. See FRANCE.

Lyre, probably the most primitive of all stringed instruments, invented, according to the tradition of the Egyptians, A. M. 2000. It was of a very graceful form, possessing a hollow body to swell the sound, and was played upon with a *plectrum*, or stick of ivory or polished wood. It was, in fact, a rudimentary harp. See HARP.

M

M. The Roman M, probably as the initial of *mille*, denotes 1,000. — m., in this work, is the abbreviation for mile.

Macadamized Road, a road prepared and made durable, level, and firm, by pounded granite, hard freestone, etc., which binds the earth into a solid mass; named after the introducer.

Many machines have been contrived for crushing stones for this kind of use. In Ellis and Everard's *stone-crushing mill* a strong feeding-apron, made of iron links and bars, and having a continuous action around two wheels, carries fragments of stone to a spot where they are tilted over into a hopper. The fragments come under the action of two chilled iron rollers, which break them to a certain degree, and then between two others, which further reduce them to one uniform size. The rolls are fluted in a peculiar way, and are adjusted to any required interval apart. The stones pass into a revolving riddle, which separates those which are of the proper size from others which, being too large, are raised by an elevator and crushed a second time. The rolls weigh about 10 cwt. each, and will crush about 1,800 tons of granite before requiring to be recast. Another machine for crushing stones is described under BREAKER (STONE).

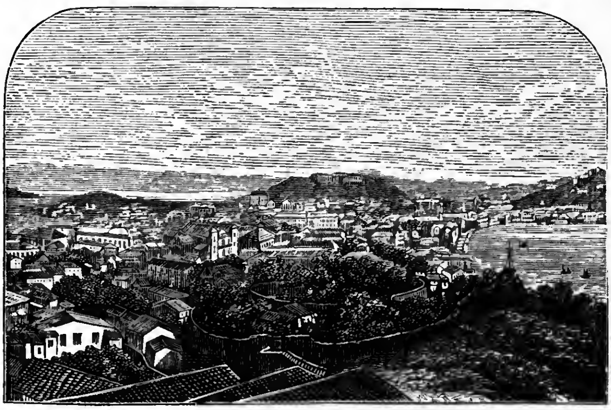

Fig. 331. — MACAO.

Macao, a seaport and settlement belonging to the Portuguese, on the island of the same name, at the mouth of the Canton River, in China, in lat. 22° 12′ 45″ N., lon. 113° 35′ E. The situation of Macao strikingly resembles that of Cadiz. It is built near the extremity of a peninsula projecting from the S. W. corner of the island of Macao, to which it is joined by a long narrow neck. The greatest length of the peninsula belonging to the Portuguese, from N. E. to S. W., is under 3 m., and its breath under ½ m. The broadest part, to the N. of the town, is flat, and of a light sandy soil; but is well cultivated, principally by Chinese, and produces all sorts of Asiatic and European culinary vegetables. Pop. in 1871, 71,739, mostly Chinese.

The Portuguese obtained possession of *M.* in 1586 It was for a considerable period the seat of a great trade, carried on not only with China, but with Japan, Siam, Cochin-China, the Philippine Islands, etc.; but for many years part of it has been of comparatively little importance, though it is probable that if it belonged to a more enterprising and active people, it might still recover the most of its former prosperity. The public administration is vested in a senate composed of the bishop, the judge, and a few of the principal inhabitants; but all real authority was in the hands of the Chinese mandarin resident in the town, till 1849, when the port was made free to all nations. Little shipping is owned in the place, and the trade is carried on almost wholly by Chinese and British merchants. The harbor is on the W. side of the town, between it and Priest's Island, and is small and inconvenient of access, save by vessels of comparatively light draught, of which, moreover, no great number can be accommodated at one time. The water not being sufficiently deep to admit large ships, they generally anchor in the roads on the other side of the peninsula, from 5 to 10 m. E. S. E. from the town, an open sea-way protected only on the S. by the island called the Typa. A steamer runs daily from Hong-Kong to Macao and back, accomplishing the journey in 4 hours. All vessels coming into the roads send their boats to the Portuguese custom-house on the S. side of the town. The principal exports are tea, rice, anise-seed, and canella; imports, opium, cotton, and silk. There is almost no direct trade between *M.* and the U. States.

Macaroni, a species of wheaten paste formed into long, slender, hollow tubes, used among us dressed with cheese, and in soups, broth, etc. *M.* is the same substance as vermicelli; the only difference between them being that the latter is made into smaller tubes. Both of them are prepared in the greatest perfection in Naples, where they form the favorite dish of all classes, and the principal food of the bulk of the population. The flour of the hard wheat (*Grano duro*) imported from the Black Sea is the best suited for the manufacture of *M.* Being mixed with water, it is kneaded by means of heavy wooden blocks wrought by levers till it acquires a sufficient degree of tenacity; it is then forced, by simple pressure, through a number of holes, so contrived that it is formed into hollow cylinders. The name given to the tubes depends on their diameter; those of the largest size being *M.*, the next to them *vermicelli*, and the smallest *fedelini*. The dough is also stamped out into small ornamental pieces, known under the general name of *Italian pastes*. At Genoa, and some other places, the paste is colored by an admixture of saffron; but at Naples, where its preparation is best understood, nothing is used except flour and water; the best being made of the flour of hard wheat, and the inferior sorts of the flour of soft wheat. When properly prepared and boiled to a nicety, Neapolitan *M.* assumes a greenish tinge. It is then taken out of the caldron, drained of the water, and being saturated with concentrated meat gravy, and sprinkled with finely grated cheese, it forms a dish of which all classes, from the prince to the beggar, are passionately fond. But the *M.* used by the poor is merely boiled in plain water, and is rarely eaten with any condiment whatever. *M.* is largely manufactured in France, and to some extent in Philadelphia and New York, but none of these products command the price of the *I. M.*, which is extensively imported in boxes of from 12 to 28 lbs.

Imp. duty, 2 cts. per lb.

Macaroon, a small sweet wine-cake.

Macaw-Fat, a West-Indian name for the oil-palm (*Elæis guineensis*).

Macaw-Feathers, the feathers of different species of parrots, used for ladies' bonnets.

Macaw-Palm, the *Acrocornia sclerocarpa*, which occurs in considerable abundance in some of the West India Islands and the eastern part of S. America. The fruit yields an oil of a golden yellow hue, of the consistence of butter, which has an odor like violets, and a sweetish taste. It enters into the composition of toilet soaps. The nuts,

which are susceptible of a high polish, are sometimes fancifully carved by the negroes.

Maccaboy, Maccoboy, a finely ground, high-colored, and frequently perfumed snuff, of American manufacture.

Mace [Dutch, *foelie muscatabloom;* Fr. *macis, fleur de muscade;* Ger. *Macis, Muskatenbluthe;* It. *mace;* Port. *maxcis, flor de noz moscada;* Sp. *macio*], a thin, flat, membranous substance, enveloping the nutmeg; of a lively, reddish yellow color, a pleasant aromatic smell, and a warm, bitterish, pungent taste. Mace should be chosen fresh, tough, oleaginous, of an extremely fragrant smell, and a bright color, — the brighter the better. The smaller pieces are esteemed the best. The preferable mode of packing is in bales, pressed down close and firm, which preserves its fragrance and consistence. It is imported from Penang and Singapore, where the best is to be found. About 45,000 lbs. are yearly imported into the U. States.

Imp. duty, 25 cts. per lb.

Mace, a Chinese money and weight; the former is the 10th part of the tael, nearly 15 cts., and consists of 100 to 140 copper cash; as a weight, it is about 58 grains.

Maceration, the infusion of substances in cold liquids. The term is usually employed with regard to vegetable substances, when they are reduced to powder and exposed to the action of water, or any other liquid, without the assistance of heat, in which last respect it differs from *digestion. M.* is useful either when it is required merely to soften the parts of the substance operated on, as when cinnamon and cloves are macerated in water before distillation, or in cases where heat would be injurious, as when volatile or aromatic substances are used.

Machine, any piece of mechanism or contrivance for performing some work. In a *M.* the *power* is the force employed in working it; the *resistance, weight*, or *load*, expressed (as is also the power) in terms of weight whose unit is usually the pound avoirdupois, is the resistance offered to the force by the body acted on; the *point of application* is the point at which the power is applied; the *working point* is that part of a machine which is immediately applied to the resistance. *M.* are either *simple* or *compound*. The simple *M.*, otherwise called the *simple mechanical powers*, are usually reckoned six in number, namely, the *lever*, the *wheel and axle*, the *pulley*, the *wedge*, the *screw*, and the *funicular M.* Compound *M.* are formed by combining two or more simple *M.* There are numberless kinds of *M.* employed for different purposes. See ENGINE.

Work done by Machines. The moving power which is applied to any machine moving uniformly is employed in overcoming the resistance of friction, and useful work done at the working points of the machine. Hence, the aggregate number of units of useful work yielded by any machine at its working point is less than the number received upon the machine directly from the moving power, by the number of units expended upon the resistance of friction (the machine moving uniformly).

General Rule to find the Work done by any Machine.

Find the distance through which the power (P) applied to the machine has travelled in one minute, and let this distance be called (a).

Find the distance through which the weight (W), producing useful work, has travelled in one minute, and let this distance be (b).

Then $a\ P - b\ W =$ work done by friction per minute.
And $a\ P =$ work applied per minute
$b\ W =$ useful work done per minute.

Machine-Tool is a mechanical contrivance in which the tool is directed by guides and automatic appliances. The machine-tools are practically the makers of all machines, whether for spinning cotton, rolling iron, developing steam prime-movers, making paper, weaving lace, stamping buttons, drawing wire, or anything else. What the machine-tools really effect is, to give shape to pieces of metal and wood, leaving workmen afterwards to put those pieces together, and make them up into engines, machines, and apparatus of various kinds. Of the great variety of machine-tools the principal are the turning, planing, slotting, drilling, shaping, punching, shearing machines, and the steam hammer.

Machinery, the collective name for machines and engines of all kinds, which are put into action to perform certain effective work which supersedes manual labor. See IRON.

Machining, working off newspaper or book sheets at a steam press, often contracted for at an agreed rate per thousand.

Machinist, one engaged in the manufacture of machines. — An employé at a theatre, who attends to the working of the movable scenery.

Macintoch [from the name of the inventor], a solution of india-rubber in coal naphtha, applied to linen cloths and other substances, to render them water-proof; also an india-rubber overcoat This name is now almost obsolete. See INDIA-RUBBER.

Mackerel, a well-known useful fish, of which there are several varieties composing the genus *Scomber.* The *M.* of our coasts, *S. vernalis*, is from 16 to 18 inches long, dark steel-blue above, becoming lighter on the sides, and with 24 to 30 vertical deep-blue half-bands; beneath silvery, with smaller reflections. Their ordinary weight is about 2 lbs. each. They require to be eaten very fresh, as they soon become unfit for food. The largest are not considered the best. They are caught in the waters of Massachusetts Bay from the beginning of April through the summer, sometimes in immense quantities, sometimes almost wanting. The *M.* makes another visit in autumn, but the quantity then taken is generally smaller. The principal fishing ports are Provincetown, Wellfleet, Harwich, Dennis, Cohasset, Boston, Salem, and Gloucester, in Massachusetts, and Portland, Southport, Boothbay, Camden, North Haven, and Deer Isle, in Maine. The vessels used are schooners of about 60 tons in average, carrying about 15 men. The fish is now generally caught with seines. A seine weighs about 2,000 lbs., and is 175 fathoms long by 24 fathoms in depth in the middle, the depth gradually diminishing to 11 fathoms at the ends. The bait, which most usually consists of porgies, is ground in a bait-mill, and thrown from boxes hung over the side of the vessel. — For regulations and statistics of the *M.* fishery, see SEA-FISHERIES.

"The process of dressing *M.* consists of four distinct operations, splitting, gipping, ploughing, and salting. The splitter splits the fish at the rate of 1,500 per hour, the knife passing along the back from the head to the tail, leaving the backbone on the right side, and throws them into a tub Two gippers stand at each tub, remove the gills and entrails, and pass the fish into a barrel, called the "wash" barrel, where they are allowed to soak. Subsequently they are taken out singly, laid on a board skin down, and a light stroke of the plough, which consists of a piece of knife-blade or similar instrument, is given on each side of the fish from the head two thirds down to the tail. When the fish are taken rapidly, however, this operation (which is designed to give the fish an appearance of fatness) is sometimes postponed until after they are landed The last operation, salting, is performed by laying the fish singly in a barrel and sprinkling a light handful of salt on each. They are then allowed to remain over night, when some of the pickle is drained off, and the barrels are filled, headed up, and stowed below. A little less than a bushel of salt is used for a barrel, and it requires five wash barrels to make four barrels of salted fish. After being landed the *M.* are assorted, inspected, and branded by a state officer appointed for the purpose, and repacked for market. The size and quality are denoted by the numbers 1, 2, 3, and 4. No. 1 *M.* must be 13 in. long; No. 2, 11 in. To rate as No. 1 or No. 2 they must also be fat and in good condition. When of inferior quality, and 13 in in length, they are branded as No. 3, large; between 10 and 13 in.,

No. 3. All other *M.* free from taint or damage are rated No. 4. The first cargoes landed are invariably poor, and usually of good size. As the season advances the *M.* improve in condition, and after the beginning of July they are usually fat enough to pack according to size. The method of employing the crew in general use is known as the "half-line lay." By this method the crew draw one half of the gross stock, out of which they pay the cook's wages, one half of the bait bill, and one half of the expense of packing, realizing about 40 per cent net. When the hook and line are used, the fish caught by each man are kept separate, and the voyage is settled individually. In the cases of seiners the voyage is simply divided into shares for the men and parts of shares for the boys. The manager or "boss" of the seine generally receives from $50 to $100 extra from the owners, who also pay the captain a commission (usually about 4 per cent) on the gross stock. The price of *M.* in the market, particularly the better qualities, is subject to great fluctuations. The average earnings of a fisherman employed through the season may be stated at $300. The season begins about the first of April, and the fleet gradually increases until July, the greatest number of vessels being employed from that time to the early part of November, when the season closes. The early fleet, from 25 to 50 sail, first find the *M.* as far S. as Cape Henry and about 50 m. from land. For the first two months they ice the fish as soon as caught, and bring them fresh to the New York market; after that they carry salt and barrels and cure the fish. As the season advances the *M.* move N., the distance from the shore varying with the wind, being less with a W. than an E. wind; and from about the first of May to the latter part of June they are found from Cape May to Gay Head. About the first of July they move E. around the S. side of Nantucket, and from then until September they may be caught anywhere from that island to Cape Sable. During July and August many of the vessels cruise on George's Bank; after the first of September the fleet is scattered from the Maine coast around the shore to Chatham, the last catch being usually off that port. A small fleet of "market boats," from 30 to 50 tons each, from Boston, Swampscott, and Duxbury, supply the Boston market with fresh fish, making their first trip about the middle of May, when *M* first appear in Boston Bay, and continuing until the last of November. In June a number of vessels, principally from Gloucester, Maine, and Nova Scotia, proceed to the Gulf of St. Lawrence, and pursue the fishery chiefly around the shores of Prince Edward Island and the Magdalen Islands. This fleet increases during July and August, and is largest from that time until the last of October, when the season closes. The importance of the Gulf fishery in comparison with the shore fishery, as that along the Atlantic coast is termed, has recently diminished." — *American Cyclopædia.*

Macon. See Burgundy Wines.

Macuja Oil, a concrete yellow oil, obtained from the fruit of the *Acrocornia sclerocarpa* palm, in Brazil.

Madagascar, the largest of the African islands, situated to the east of the continent, from which it is separated by the Mozambique Channel, and surrounded by the waters of the Indian Ocean, in lat. 11° 57′ to 25° 38′ S., and lon. 43° 15′ to 50° 30′ E. The territory of the Hovas, the dominant tribe, is ruled by queen Rasoherina II., whose influence and authority extend over a great part of the island; capital, Tananarivo. It is 980 m. in length, and 360 at its greatest breadth; area, 228-570 sq. m. The soil is in general fertile, with rich pasturage, and magnificent forests abounding in valuable trees and medicinal plants; the other products are rice, sugar, silk, cotton, cocoanuts, bananas, sweet potatoes, indigo, pepper, india-rubber, etc. The mineral products are few: iron ore is found in several places, and coal is also said to exist; gold, silver, copper, and lead are also found in small quantities. The principal manufactures are jewelry, chains, necklaces, straw hats, and dresses, termed lambas. The principal imports are cotton sheetings, calico prints, crockery, rum, shoes, salt, and hardware; principal exports, india-rubber, hides, beeswax, arrow-root, gum copal, and a coarse matting called *rabannes.* The chief trade is with Mauritius and Bourbon. The principal ports are Tamatave, on the E. coast, where a U. States consular agent is accredited; and Majunga, in the Bay of Bembatooka. Estimated pop. 3,000,000.

Madagascar Nutmeg. See Clove-Nutmeg.

Madapollam, a kind of fine cotton long cloth, originally made in India, but now shipped from England to the East Indies.

Mad Apple, the fruit of the *Solanum melongena*, of an oblong egg-shape, used in cookery, and esteemed a nutritious vegetable.

Madder [Dutch, *mee, krap;* Fr. *garance, alizari;* Ger. *Krapp, Färberröthe;* It. *robbia;* Sp. *granza, rubia*], a cheap, durable red dye, obtained from the root of a trailing plant (*Rubia*), cultivated in Alsace and Provence in France, especially near Avignon, in Dutch Zealand, Asiatic Turkey, and in Italy; from which places it is largely exported. The Turkey and Provence madder is procured from the variety termed *Rubia peregrina*, the remainder from the *Rubia tinctoria* (Fig. 332). The substance contains at least two distinct coloring principles, a fawn and a red; yielding two tints, namely, *M.-red*, which contains the whole of the coloring matter, and *Turkey-red*, the superior brilliancy of which arises from the red portion being alone preserved. *M.* is extensively used for dyeing calico, linen, and woollen cloth, and in the preparation of *M.*-lakes. The roots are taken up at the end of September and kiln dried. The best are about the thickness of a goose-quill, semi-transparent; when broken, of a reddish color, verging towards purple, possessing a strong smell, and having the bark smooth: a yellow hue indicates inferiority. The importations from Turkey (*via* Smyrna) and Italy consist entirely of the roots in their natural state; but the whole of the Zealand *M.*, and the greater part of the French, is shipped in the state of powder. In Zealand, previous to grinding, the roots are carefully assorted: the interior bright part of the finest makes *crop-M.*; *ombro* is prepared from good roots not peeled; *gamene* is the ordinary powder; and *mull*, made from peelings and refuse, is an inferior sort used for cheap dark colors. In France it is prepared nearly in the same manner. *M.* may be preserved a long time, but being injured by moisture, which it readily absorbs, it should be kept in a dry place. Our imports of *M.* for the year 1879 (mostly from Holland) amounted to 1,624,533 lbs., valued at $83,116.

Fig. 332. — Madder.

Imp. free.

The composition of *M.* is very complicated. It has been found, however, to contain, principally, *alizarine* which appears to be the coloring principle; *rubiarine*, which has no tinctorial property; *alpha* and *beta resin*, and *xanthine*, which not only gives no color itself, but actually interferes with the

action of the alizarine of the *M.* on mordanted cloth. To remove this xanthine it is usual to convert the *M.* into what is technically called *garancine*, by treating it with hot sulphuric acid until it has acquired a dark brown color, then adding water, straining and washing, until all the acid is removed. The advantages which garancine is said to have over *M.* are, that it dyes finer colors, that the part destined to remain white does not acquire any brown or yellow tinge, and that its tinctorial power is greater than that of the *M.* from which it has been prepared: the superiority of garancine is attributed to two causes, — the separation by the acid of the lime and magnesia combined with the coloring matter, and the decomposition and removal of the xanthine by the oil of vitriol. Some objections have been taken to these views, and some of the most celebrated French calico-printers affirm that the *M.* of Avignon, though richer in color than those of Alsace, afford little or no alizarine.

In dyeing *Adrianople* or *Turkey red*, the first step consists in cleansing and removing all greasy matters from the fabric to be dyed. This is effected by some tedious operations of the dung-bath, — a process of oiling, — and then washing in an alkaline bath. Then follows the galling operation, which consists in steeping the cloth in a bath of Sicilian sumach or of nutgalls; next we have the mordanting, by soaking in a bath of alum, to which potash and chalk are added, for twelve hours, and then, being well rinsed in clean water, the cloth is immersed in the madder bath and receives its dye. Every pound of cotton or woollen cloth requires from two to three pounds of *M.* The bath being made, the fabric is placed in it cold, and constantly worked about until it is thoroughly impregnated with the dye; the fire is got up under the copper, the fluid is brought to boil, and ebullition is continued for two hours. Several gallons of bullocks' blood are added to the cold bath, which is supposed to have some effect in improving the color. This being accomplished, the *brightening* of the dyed cloth follows, which is effected by *rosing* or boiling it with soap and water, and then passing it into a bath of hydrochlorate of tin, which is prepared by dissolving grain tin in nitro-hydrochloric acid.

Lakes are obtained from Brazil-wood and other substances (see LAKE), but the finest, after carmine, are procured from *M.* The process of obtaining them is as follows: A quantity of *M* is soaked in water for a quarter of an hour, and then squeezed in a press; this operation is repeated twice with the same portion. Alum is then added, and the infusion heated upon a water bath for three or four hours, water being added as it evaporates; the liquor is then carefully filtered, and the lake, *aluminated alizarine*, is to be precipitated by carbonate of potash. After precipitation the lakes are well washed, and then dried on blocks of chalk in a drying stove. In the preparation of the *M.*-lakes attention to the most minute details of each division of the process is required. The quality of the water employed materially influences the resulting color, and it is found that distilled water cannot be employed with advantage. Experience proves also that the most brilliant lakes are made on the brightest days, and that a cloudy day will so far injure the color as to make a visible difference and affect its value.

Madeira. The Madeira Isles are a group in the Atlantic Ocean, belonging to Portugal, from the S. W. coast of which they are distant 660 m. They consist of the islands of Madeira and Porto Santo, and the uninhabited islets called the Desertas, situated between lat. 32° 23′ 15″ and 33° 7′ 50″ N., and lon. 16° 13′ 30″ and 16° 38′ W. Total area, 317 sq. m.; pop. 121,753. Madeira, the principal island, consists of one large mountain, with branches rising everywhere from the sea towards the centre of the island. It is very fertile and beautiful. The climate is mild and healthy; the mean temperature of the year not exceeding 65°. Vines long formed the chief object of cultivation, and large quantities of the wine were exported, particularly to England and the U. States (see PORTUGAL, WINES OF); but the growth of the island, which was formerly estimated at 30,000 pipes, has considerably diminished. This decline, attributed partly to the frequency of adulteration, partly to the preference given to the sherry and French wines, and principally to the devastations of the *oidium*, has led to a great part of the soil being applied to other purposes. The culture of maize and other cereals has been extended on the higher grounds; the planting of coffee has become very general in the island, and with considerable success, and the rearing of cochineal has been largely extended.

The only port is *Funchal*, an irregularly built, dirty town, situated in the centre of a large bay. It has no harbor, and the roadstead is not secure, especially in winter. The merchants are chiefly English. The principal articles of export are wine, cochineal, and embroidery. The imports, mainly from England, consist of cotton, woollen, and linen fabrics, fancy and dress goods, hardware, etc. For the year 1878 the total value of exports from *M.* was $907,812, and of imports, $1,481,917. The direct exportation of wine to the U. States, which formerly employed about 40 vessels, with an aggregate tonnage of 10,000 tons, has been almost totally discontinued.

Madras. See INDIA (BRITISH).

Madrepore, a petrification, or species of coral; a variety of limestone.

Madrid. See SPAIN.

Madrier [Fr.], a thick board or plank.

Madura. See JAVA.

Magazine, a warehouse or store-room. — A secure place for keeping powder in, ashore or afloat. — A periodical publication. — A name applied to fire-arms which contain a supply of cartridges automatically fed to the chamber at the rear end of the barrel. See GUN.

Magdalena. See COLOMBIA (U. STATES OF).

Magellan (Straits of) divide the continent of South America from the Island Tierra del Fuego; the east entrance is formed by Cape de la Virgines on the main-land, and by Cape del Espiritu Santo (Queen Catharine's Foreland) on one of the largest islands composing Tierra del Fuego. Length nearly 300 m., extending between lat. 52° 10′ and 55° S., and lon. 68° 20′ and 75° W. The navigation of the straits of *M.* is difficult for large sailing vessels, which seldom attempt it; but it is invaluable for small vessels, and especially for steamers.

Magenta, one of the red or crimson dyes or colors derived from aniline.

Magic Lantern, an optical machine, with a lamp and lenses for reflecting magnified pictures on the wall from painted glass slides.

Magilp, a gelatinous compound formed by a mixture of linseed oil and mastic varnish, and used by artists for conveying their colors.

Magna Græcia Ware, a term sometimes applied to Etruscan vases, urns, and other kinds of ancient pottery.

Magnanerie [Fr.], a nursery for silk-worms.

Magnesia, an alkaline earth, known long before the metal *magnesium*, of which it is an oxide. It is readily obtained by burning the carbonate of *M*, whence it is sometimes called *calcined M.*, but the sources that chiefly furnish it are the sulphate of *M.* (see EPSOM SALT), of mineral springs, or this salt mixed with chloride of magnesium supplied by the bittern of salt-works. It is a white powder, varying in density according to the source from which it is obtained. It is unalterable by heat, and has never been fused. It slowly absorbs carbonic acid and water from the air; moistened with water, it combines with it, raising the temperature during the union, and giving rise to *hydrate of M.* Crystallized hydrate of *M.* occurs in nature as the mineral brucite. It forms a white powder, which slowly absorbs carbonic acid from the air. Its water is easily expelled by heat. It is sparingly soluble in water, forming a solution exhibiting an alkaline reaction. It is used in pharmacy as an antacid and cathartic.

Carbonates of M. There are three carbonates of *M*, — the bicarbonate, monocarbonate, and subcarbonate. The monocarbonate is found in nature in a hydrated condition, as the mineral magnesite. The anhydrous salt may be prepared by placing a tube containing a solution of carbonate of soda in a strong glass tube containing a solution of sulphate of magnesia, sealing the outer tube hermetically, heating it to 320° Fahr., and inverting the whole, so that the solutions may mix, — crystalline grains of anhydrous carbonate being deposited. It is insoluble in water, but dissolves in acids. Heated, it be-

comes converted into *M.* It dissolves in water saturated with carbonic acid, forming bicarbonate of *M.* The subcarbonate is prepared by boiling a solution of the sulphate with excess of carbonate of potash or soda, and filtering and washing until the washings give no precipitate with chloride of barium. Prepared thus, it forms a bulky white powder, and is known as *light carbonate of M.* The *heavy carbonate* has the same composition, and is prepared by mixing hot solutions of carbonate of soda and sulphate of *M.* It is much less bulky than when prepared in the preceding manner. Both forms are extensively used in medicine as a cathartic and antacid. — The *sulphate* and *citrate of M.* are also considerably used as cathartics. The effervescing preparations, both solid and liquid, known as citrate of *M.* and popularly used as laxatives, usually contain, in addition, citrate or tartrate of sodium or potassium. The *phosphate* is a valuable constituent in fertile soils, and is found in the husk of grain, in potato, and in many other plants; the *silicate* constitutes meerschaum and other mineral substances.

Imp. duty: calcined *M.*, 12 cts. per lb.; carbonate of *M.*, 6 cts. per lb.

Magnesium is one of the many metals which are more useful in the arts in a compound than in a native state (see MAGNESIA). When pure, it is white, silvery, and fuses at a dull red heat. It is a very light metal, its sp. gr. being only 1.743. The best known of its properties when in a metallic state is the intense light which it gives out when heated.

M. Light. In the form of wire, or of narrow ribbon, *M.* burns easily in the air, producing a light of dazzling brilliancy, which among artificial modes of illumination is rivalled only by the electric light. Lamps have been contrived for burning the wire in such a manner as to obtain a steady light, the wire being pushed forward at a regulated rate by clock-work. The *M.* light is rich in the rays which act upon sensitive photographic plates, and it has been successfully employed in obtaining photographs of dark interiors, such as vaults or caverns, and for the exploration of mines and other dark places. The brilliancy of the firework displays which can be produced by *M.* far surpasses that obtainable by any other material used by the pyrotechnist. In such exhibitions balloons are sent up having burning *M.* attached to them; and the metal in the state of filings is also mixed with other materials. But *M.* is still a costly metal, and, while the firework-makers find it too expensive for common use, they complain that its brilliancy in occasional displays dulls by contrast the effect of the ordinary fireworks, with which the spectators are no longer satisfied. *M.* wire is not produced by drawing, as the metal is not ductile. The metal is forced in a heated and softened state through a small opening in an iron cylinder. The intensity of the *M.* light has been measured by Bunsen and Roscoe. They say that 72 grains *M.*, when properly burnt, evolve as much light as 74 stearine candles burning for 10 hours, and consuming 20 lbs. of stearine. Lamps are made, in which *M.* may be steadily burnt. In the more elaborate forms of these lamps there are springs and wheels for pushing forward the *M.* ribbon, or a strand of *M.* wire, into the flame of a spirit-lamp; while at the same time the *M.* wire is made to revolve on its axis, in order to overcome its tendency to bend down, which would be a great disadvantage when the light is used for optical apparatus. But for ordinary purposes a much simpler arrangement suffices: the *M.* ribbon or wire is coiled on a drum, from which it is drawn off by passing between two little rollers, which are turned by hand. The wire or ribbon is drawn off the drum by the rollers, and pushed forward through a guiding tube, which brings it into the apex of the flame of a spirit-lamp. In this simpler form of lamp the rate is, of course, directly dependent on the person who turns the winch of the feeding-rollers, but in the automatic lamp there are appliances for adjusting the rate; the suitable speed must be first found by trial, and then the apparatus is to be regulated accordingly. By means of these lamps photographs can be taken as quickly as with sunlight, on account of the abundance of chemically active rays given out by the burning *M.* Another form of *M.* lamp is *Larkin's M. Powder-lamp*, in which arrangement a mixture of finely divided sand and powdered *M.* is projected in a graduated stream, and is submitted to combustion, in place of a wire or ribbon of the pure metal. It is simple in construction, small in size, and very portable; and the light is continuous, and quite under control. It is easily ignited, and as easily extinguished; and as the *M.* is burned in powder, all clock-work, etc., is dispensed with. The usefulness of the *M.* light will mainly depend on the degree to which the metal can be cheapened.

Magnet [Dutch *magneet;* Fr. *aimant;* Ger. *Magnet;* It. *calamita;* Sp. *iman*]. The *loadstone*, or *natural M.*, is a kind of rich iron ore, which has the property of attracting light pieces of iron towards it. It is found in various parts of the earth, in irregular or crystalline fragments, and occasionally in beds of considerable thickness. If a piece of this magnetic iron ore be carefully examined, it will be found that the attractive force for ferruginous particles is greater at certain points of its surface, while elsewhere it is much diminished, or even altogether absent. The attractive points are called the *poles* of the *M.* This singular substance was known to the ancients, and they had remarked its peculiar property of attracting iron; but it does not appear that they were acquainted with the wonderful property which it also has, of turning to the pole when suspended, and left at liberty to move freely. Upon this remarkable circumstance the mariner's compass depends, an instrument which gives us such infinite advantages over the ancients. It is this which enables the mariner to conduct his vessel through vast oceans out of the sight of land, in any given direction; and this directive property also guides the miner in subterranean excavations, and the traveller through deserts otherwise impassable. The natural *M.* has also the quality of communicating its properties to iron and steel; and when pieces of

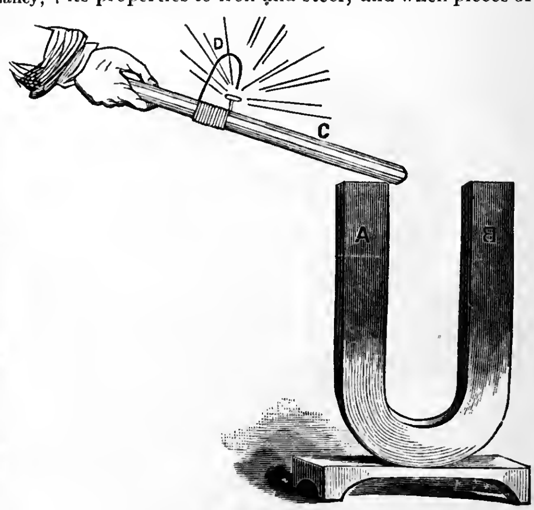

Fig. 333. — MAGNETO-ELECTRIC SPARK.

steel properly prepared are touched, as it is called, by the loadstone, they are denominated *artificial M.* See COMPASS and ELECTRO-MAGNET.

Magnetic Needle, a slender, poised bar or plate of magnetized steel. See COMPASS.

Magnetic Ore. See IRON.

Magnetism, literally, the attractive and repulsive power of the loadstone; generally that peculiar property possessed by many mineral bodies, and by the whole mass of the earth, through which, under certain circumstances, they mutually attract and repel one another, according to determinate laws. See MAGNETO-ELECTRICITY.

Magneto-Electricity. When it had been shown that an electric current was capable of evoking magnetism (see ELECTRO-MAGNET), it seemed reasonable to expect that the reverse operation of obtaining electric currents by means of magnets should be possible. Faraday succeeded in solving this interesting problem in 1831, and one of his earliest, simplest, and most convincing experiments for the demonstration of the production of electricity by a magnet is represented

in Fig. 333. A B is a strong horse-shoe magnet, C is a cylinder of soft iron, round which a few feet of silk-covered copper wire are wound; one end of the wire terminates in a little copper disk, and the other end is bent, as shown at D, so that it is in contact with the disk, but pressing so lightly against it that any abrupt movement of the bar causes the point of the wire and the disk to separate. When the bar is allowed to fall upon the poles of the magnet, the separation occurs, and again when it is suddenly pulled off; and on each occasion a very small but brilliant spark is observed where the contact of the wire and disk is broken. If a coil of fine insulated wire be passed many times round a hollow cylinder, open at the ends, and the extremities of the wire connected with a galvanometer at some distance, then if into the axis of the coil a steel magnet be suddenly introduced, an immediate deflection of the needle takes place; but after a few oscillations it returns to its former position. When the magnet is quickly withdrawn, the needle receives a momentary impulse in the opposite direction. The magnetization and demagnetization of the iron core in the induction coil would, therefore, of itself cause induced currents, for these actions are equivalent to sudden insertion and withdrawal of a magnet. Upon this principle many ingenious machines have been constructed for producing electric currents by the relative motions of magnets and of soft iron cores surrounded by wires. Most of the magneto-electric machines are formed of a long bar of soft iron, of a section like this, ⊢⊣, and the wire is wound longitudinally between the flanges from end to end of the bar, up one side and down the other. This armature rotates about its longitudinal axis between the pairs of the poles of a file of horse-shoe magnets, either permanent, or electro-magnets excited by the magneto-electric currents. In this case opposite poles are induced along the edges of the bar, and these poles are reversed at each half-turn. The intensity of the induced currents increases with the velocity with which the armature is made to revolve up to a certain point; but because the magnetization of the soft iron requires

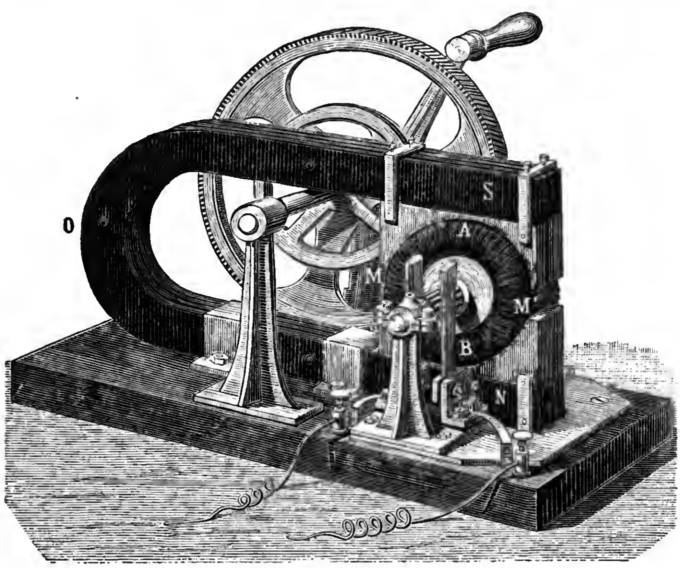

Fig. 334. — Gramme Machine for the Laboratory.

a sensible time to be effected, and the poles are reversed at every half-turn, it is found that a speed increasing beyond the limit is attended by decrease of the intensity of the current. The intensity in such machines has, therefore, a definite limit. But in a modification of the magneto-electric machine, invented by M. Gramme in 1871, and since much improved, the limit is vastly extended by the ingenious disposition of the iron core and armatures, and his machines appear to have solved the problem of the cheap production of steady and powerful electric currents, so that electricity can be now applied in processes of manufacture where the cost of electrical power has hitherto placed it out of the question. We shall now endeavor to explain the principle on which the Gramme machine depends, and describe two of the forms in which it is constructed.

The Gramme magneto-electric machine. Fig. 334 shows a form of the Gramme Machine adapted for the lecture-table or laboratory. A M' B M is the soft iron ring, covered with a series of separate coils placed radially, O is a compound horse-shoe steel magnet, S its south pole, N its north pole, each pole being armed with a block of soft iron hollowed into the segment of a circle and almost completely embracing the circle of coils. The magnetism of each pole is strongly developed in the interior faces of these armatures. The inductive action tends to produce two equal and opposite currents, which, like the currents of two similar voltaic batteries joined by their like poles, neutralize each other in the connected coils, but flow together through an external circuit. — Fig. 335 represents one of the Gramme light-producing machines, which, when made with fewer coils, is also adapted for electrotyping purposes. The electro-magnets are excited by a portion of the currents they themselves produce, they retaining sufficient residual magnetism to develop the currents. There is a pair of current-collectors on each side, and by means of a connecting cylinder (seen at the base of the machine) the currents can be combined for quantity and for tension as may be required. This machine is about 2 feet square, and it produces a light equal to 200 burners, which may be increased by increasing the speed. The value of M. Gramme's invention for electro-plating is proved by the fact of its adoption by Messrs. Christofle of Paris, whose electro-plating establishment is one of the largest in the world This firm has no fewer than fourteen of these machines at work, and each is capable of depositing 74 oz. of silver per hour. There is little doubt that the electric current will now soon be employed for reducing metals. Thus fine copper may perhaps be obtained at about the cost of ordinary copper; potassium, sodium, and aluminium at less than half their present price; and magnesium, calcium, and other rare metals at prices which will bring them into commercial use. Another form of the same machine is intended for electro-plating and for general purposes: it supplies the means of readily and cheaply plating with copper, or with any other metal, such articles as steam-pipes, boiler-tubes, ship-plates, guns, bolts, nails, marine engines, machinery, culinary vessels, cisterns, etc. The advantage of protecting iron or other material from corroding agents is obvious; and as iron coated with copper is available not only for useful, but also for artistic purposes, as a cheap substitute for bronze, this invention will doubtless lead to a greatly extended application of bronzed iron in buildings and ornamental structures. The Gramme machine well illustrates how mechanical work may be changed into electricity, and electricity caused to do work. The power required to drive the machine at a given speed is much less when no current is being drawn from it than when the current is flowing. If the current from one machine is sent through the armature of another, the latter revolves, and may be made to do work. Thus *power* may be conveyed to a distance by electricity, with only the loss caused by the resistance of the conducting wires. If, when two machines are thus connected, the direction of rotation in the first one be suddenly reversed, the armature of the second will

almost immediately stop, and then resume its motion in the opposite direction. A very interesting experiment can be performed when the circuit connecting the two machines is made to include a certain length of platinum wire. When both machines are in motion, the platinum exhibits no heating effects; but if the second machine be stopped by an assistant while the rotation of the first is continued, the wire is raised to a red heat. In this way it is shown that motion, electricity, and heat are related to each other, and are mutually convertible; for on the stopping of the second machine the electricity, being no longer used up, so to speak, in producing motion, has its power transformed into heat. — This machine is used in England in light-houses; it has also been ingeniously employed for railway brakes on some of the European lines; and it is applied

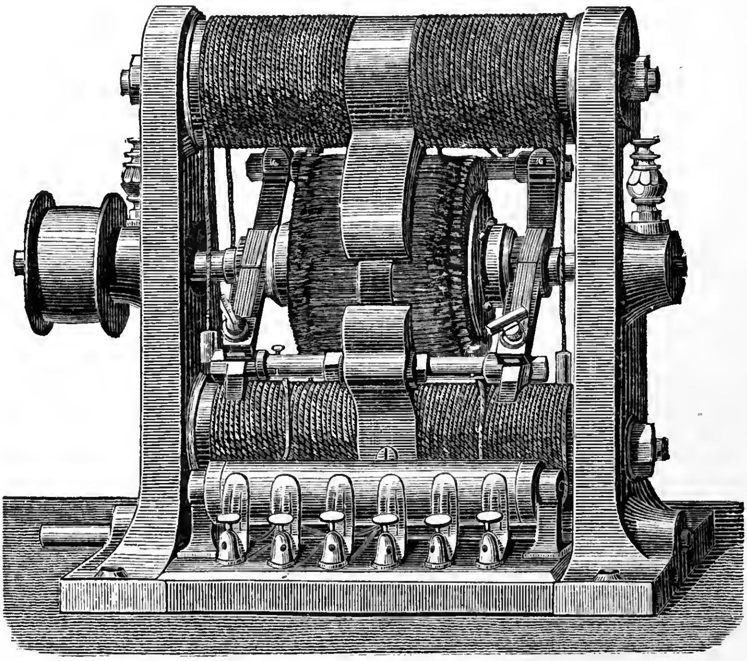

Fig 335. — Magneto-Electrical Machine, with Horizontal Electro-Magnets.

in this country to telegraphy, where the cost of zinc, acids, batteries, etc., is a considerable item. It is impossible to predict the many applications for manufacturing purposes which will be made of electricity, now a cheap, reliable, and convenient mode has been discovered of producing currents of any required strength. Though by no means the first or only machine by which mechanical force can be converted into dynamical electricity, it shows an immense advance on any former one in the regularity of the action, and in the capability of being driven at a very high rate of speed without the inconvenient accompaniments of the heating of the conductors and destructive sparks at the movable contacts.

Magneto-electric Telegraph. See Telegraph.

Magnetograph, an instrument by which the condition and changes of terrestrial magnetism are automatically registered.

Magnetometer, an instrument for measuring the force of magnetism.

Magnifying-Glass, a lens that magnifies or enlarges the object looked at.

Magnolia, a genus of trees or shrubs, remarkable for the fragrance and beauty of their flowers and foliage; hence they are favorite objects of culture in this country, either as hardy plants or as stove and greenhouse plants. *M. grandifolia*, a native of the Southern States, is the noblest species of the genus *Magnolia*. Its great height (80 feet), its shining, dark-green leaves, its fragrant white flowers a foot in diameter, form a combination of rare magnificence. Medicinally, the plants are chiefly remarkable for their bitter, tonic, aromatic properties. The bark of *Magnolia glauca*, the swamp-sassafras, or beaver-tree, resembles cinchona in its action. The unripe fruits of other species, as *M. Frazeri* and *acuminata*, have similar tonic and aromatic properties.

Magnophone, an instrument quite newly invented, said to be superior to the telephone, and to transmit sound, vocal or instrumental, with increased volume, through a wire about 8 in. long, no battery or other generative power being required for its operation.

Maguey. See Agave.

Maharmah, a muslin wrapper worn over the head, and across the mouth and chin, by Turkish and Armenian ladies when they appear abroad.

Mahoe, a genus of plants (*Hibiscus*) furnishing a useful fibre. The common mahoe of the West Indies is *H. elatus* of Swartz; the East-Indian mahoe, *H. latifolia;* the seaside mahoe, *H. tiliaceus.* The strong fibre is used in the East for making cordage, coffee-bags, etc.

Mahogany [Fr. *acajou;* Sp. *caoba*], the wood of a tree (*Swietenia mahogani*) growing in the West Indies and Central America. *M.* is one of the most majestic and beautiful of trees; its trunk is often 40 feet in length and 6 feet in diameter; and it divides into so many massy arms, and throws the shade of its shining green leaves over so vast an extent of surface, that few more magnificent objects are to be met with in the vegetable world. It is abundant in Cuba, Hayti, Honduras, etc. That which is imported from the islands is called Spanish *M.*; it is not so large as that from Honduras, being generally in logs from 20 to 26 inches square and 10 feet long, while the latter is usually from 2 to 4 feet square, and 12 or 14 feet long, but some logs are much larger. *M.*

is a very beautiful and valuable species of wood: its color is a red brown, of different shades and various degrees of brightness, sometimes yellowish brown, often very much veined and mottled, with darker shades of the same color. The texture is uniform, and the annual rings not very distinct. It has no larger septa; but the smaller septa are often very visible, with pores between them, which in the Honduras wood are generally empty, but in the Spanish wood are mostly filled with a whitish substance. It has neither taste nor smell, shrinks very little, and warps or twists less than any other species of timber. It is very durable when kept dry, but does not last long when exposed to the weather. It is not attacked by worms. Like the pine tribe, the timber is best on dry, rocky soils, or in exposed situations. That which is most accessible at Honduras grows upon moist low land, and is, generally speaking, decidedly inferior to that brought from Cuba and Hayti, being soft, coarse, and spongy, while the other is close-grained and hard, of a darker color, and sometimes strongly figured. There are several varieties of *M.*, much admired, and sought after, for the beauty of their figures and the gradations of their colors, which may be described as follows: 1. *Plain M.*, the wood of which is of one color, and equal throughout. 2. *Veiny M.*, is veined longitudinally with the grain, displaying alternately dark and light streaks, continuous, interrupted, or reappearing. 3. *Watered M.* is known by the transverse waves which exhibit to the eye an effect similar to those of a watered ribbon. 4. *Velvet-cord*, or *Caterpillar M.*, distinguished by its whitish lines, accompanied by a figured shade of fragments of roseate sprigs, here and there disposed diagonally, longitudinally, interrupted, or crossing one another. 5. *Bird's-eye M.* is besprinkled with little oval knots, which, when duly proportioned, render the wood half light and half dark. 6. *Festooned M.* offers in its color a mixture of light and shade usually resembling sheaves of wheat, feathers, wreaths, festoons, or figures of shrubs. As the wood of *M.* is generally hard and takes a fine polish, it is found to serve better than that of any other tree for cabinet-making, for which purpose it is universally admired. It is not, however, so much in fashion at the present time as it was formerly. *Imp.* free.

M. saw-dust is imported for adulterating ground madder, and is used by furriers for cleaning furs.

Mail, a common term for communications and matter transmitted by the post-office, comprising letters, newspapers, books, etc. See POST-OFFICE.

Main, the chief or principal; hence a common prefix to some sails, yards, and ports of a ship; a great channel or ditch; a large cast-iron supply-pipe under ground for distributing water or gas over a town or district; the gross or bulk of anything.

Main-Boom, the spar of a small vessel's mainsail.

Maine, the most easterly State of the American Union, and one of the New England States, between lat. 42° 57′ and 47° 30′ N., and lon. 66° 52′ and 71° 6′ W. It is bounded N. W. and N. by Quebec, E. by New Brunswick, W. by New Hampshire, and S. and S. E. by the Atlantic Ocean; extreme length N. and S., 303 m., extreme width, 212 m.; area, 31,766 sq. m. *M.* is divided into 16 counties. The principal cities and towns are Augusta (the capital), with a pop. of about 9,000; Auburn, 6,500; Bangor, 20,000; Bath, 8,000; Belfast, 5,500; Biddeford, 11,000; Brunswick, 5,000; Calais, 6,500; Cape Elizabeth, 5,500; Ellsworth, 5,500; Gardiner, 5,000; Lewiston, 14,500; Portland (the principal commercial city), 33,000; Rockland, 7,500; Saco, 6,000; Waterville, 5,000; and Westbrook, 7,000. Total population of the State, about 655,000.

M. has a greater extent of coast, and more good harbors, than any other State of the Union. Its shores are all along indented by deep bays, and the opposite sea is studded with numerous, fine, and considerable islands. Near the seaboard the surface is level, but it rises on proceeding inland, and most part of the State is hilly. On the N. W. a mountain-chain forms the water-shed between the streams that join the St. Lawrence and those that fall into the Atlantic; and a lateral branch from this chain, between lat. 46° and 46° 30′, separates the Kennebec, Penobscot, etc., on the S., from that of the St. John's on the N. Several of the summits in *M.* reach an elevation of 4,000 feet: and Mt. Katahdin, near lat 46°, which attains an altitude of 5,335 feet, is reckoned the highest ground between the Atlantic and the St. Lawrence. It has been estimated that one-sixth part of the surface of the State consists of water; there are numerous lakes, chiefly in the N., the largest of which, Moosehead, is 50 m. in breadth. The principal rivers are the St. John's, Penobscot, Kennebec, Androscoggin, and St. Croix, all having a generally S. direction, emptying into bays on the Atlantic coast. Several of these rivers are navigable for the greater part of their course. The climate is cold; ice and snow last, in the N. and central parts, from Oct. to April, and the summer is short; but the atmosphere is generally clear, the weather uniform, and the country salubrious. The soil on or near the coast is sandy and poor; but it improves greatly as it recedes inwards, especially along the banks of the rivers, and is especially adapted to grazing. The greater portion of the State was originally covered with dense forests of fine fir and birch. In the S., and some of the central districts, these have been mostly cleared, but they are still nearly unbroken in the N., and the value of the lumber cut down annually is estimated at $10,000,000. The cereals, pulse, edible roots, and flax are among the principal agricultural products. Apples and pears grow to perfection: and cherries, plums, and grapes mature in the woods. E. of the Kennebec, and along that river, are some excellent arable lands; and between it and the Penobscot are some of the finest grazing lands in New England. The vegetable products of this State are chiefly required to supply the home demand; hay, potatoes, apples, and hops are, however, largely exported. The amount and value of agricultural products for the year 1878 is given in this work under the names of each of the principal crops.

Fig. 336. — SEAL OF MAINE.

The number of farms in *M.*, as reported by the last census, was 59,804, containing 2,917,793 acres of improved land, 2,224,740 of woodland, and 695,525 of other unimproved land. The cash value of farms was $102,961,951; of farming implements and machinery, $4,809,113; total (estimated) value of all farm productions, $33,470,044; of orchard products, $874,569; of produce of market-gardens, $366,397; of forest products, $1,581,741; of all live-stocks, $23,357,129. — The chief minerals of *M.* are granite, which is fine-grained, beautiful in color, very durable, and is obtained in blocks of immense size; slate (see SLATE); limestone; and marble, which, however, is better adapted for building than for ornamental purposes. Lead, tin, copper, zinc, and manganese are also found. — The principal manufactures are cotton and woollen cloths, hats, shoes, leather, cordage, iron-wares, spirits, and maple-sugar. Ice forms a considerable item of exportation. As before stated, the grand staple and source of wealth is lumber, which is cut in the great forests of the N. in winter, floated down the rivers in the spring, prepared for market in the extensive saw-mills near the coast, and thence largely exported. Dried fish, pickled salmon, beef, pork, dairy produce, hay, pot and pearl ashes, and marble also form important articles of shipment. The imports from foreign countries and domestic exports for the year 1879 were as follows: —

Customs Districts.	Imports.	Exports.
	$	$
Aroostook	49,323	......
Bangor	13,761	163,814
Bath	19,821	48,193
Belfast	3,864	8,760
Castine	8	9,511
Frenchman's Bay	......	320

Customs Districts.	Imports.	Exports.
	$	$
Machias	835	67,761
Passamaquoddy	722,391	904,229
Portland and Falmouth	755,868	2,246,386
Saco	180	96
Waldoborough	3,512	203,328
Wiscasset	712	57,158
Total	1,570,275	3,709,556

The principal articles of export were cotton goods, bacon and hams, lard, lumber, fish, and vegetables. The following table shows the number and tonnage of vessels which entered from and cleared for foreign countries, and also the number and tonnage of vessels registered, enrolled, and licensed in the different districts: —

Customs Districts.	Entered.		Cleared.		Registered, etc., Vessels.	
Bangor	23	4,103	77	15,566	168	26,129
Bath	24	11,708	15	2,142	264	140,577
Belfast	15	2,652	25	4,187	245	51,132
Castine	4	228	32	3,117	315	20,482
Frenchman's Bay	3	602	7	754	255	15,993
Kennebunk	..	....	..	....	40	8,041
Machias	8	1,366	161	25,185	154	17,491
Passamaquoddy	466	126,873	573	145,447	184	22,054
Portland & Falmouth	215	109,994	401	171,797	384	121,845
Saco	2	224	3	420	22	1,278
Waldoborough	19	2,999	47	11,091	438	83,968
Wiscasset	3	3,043	15	7,973	160	8,959
York	..	....	..	....	11	403
Total	782	263,792	1,356	387,679	2,640	518,352

Of the total number registered, enrolled, and licensed, 2,552, of 500,922 tons, were sailing, and 88, of 17,430 tons, were steam vessels. In the coasting trade and fisheries, 3,066 vessels, of 1,349,966 tons, entered, and 2,719 vessels, of 1,164,624 tons, cleared, the several customs districts of the State. Besides the lines of steamers which play regularly between the larger ports and Boston, there are steamers playing between Portland, New York, Halifax, and St. John, and in winter-time between Portland and Liverpool and Glasgow. In 1879 the State had 988 m. of railroad in operation. The following table shows the names of the R.R. companies, the total length of roads, and the total length in Maine: —

Companies.	Total length of line.	Total length of line in Maine.
	Miles.	Miles.
Aroostook River	15.00	15.00
Atlantic and St. Lawrence	149.50	82.50
Bangor and Piscataquis	62.80	62.80
Belfast and Moosehead Lake	33.50	33.50
Boston and Maine	126.50	46.50
Bucksport and Bangor	18.80	18.80
Dexter and Newport	14.00	14.00
European and North American	114.20	114.20
Houlton Branch	3.00	3.00
Knox and Lincoln	49.00	49.00
Lewiston and Auburn	5.50	5.50
Maine Central	307.50	307.50
Portland and Ogdensburg	94.00	51.00
Portland and Rochester	52.50	49.40
Portland, Saco, and Portsmouth	51.00	51.00
Portsmouth, Gt. Falls, and Conway	71.37	2.55
Rumford Falls and Buckfield	27.50	27.50
St. Croix and Penobscot	22.00	22.00
Somerset	25.00	25.00
Whitneyville and Machiasport	7.50	7.50

In ship-building *M.* is far in advance of all the other States in the Union, the annual amount of sailing vessels built here being, in regard to tonnage, about one half of the total built in the U. States. During the year 1879 there were built in *M.* 93 vessels of 42,628 tons, consisting of 13 ships of 22,267 tons, 12 barks, 1 barkentine, 4 brigs, 41 schooners, 10 sloops, and 12 steamers. The principal yards, in rank of importance, are Bath, Waldoborough, Portland, and Falmouth, Kennebunk, and Machias. — In 1879 *M.* had 72 national banks in operation, whose paid-in capital was $10,660,000. The financial statement of this State on Jan. 1, 1879, was as follows: Total debt, $5,848,900; annual charge, $350,944; sinking fund, $1,032,995.45. Trust funds held by State, $1,955,360.85. Temporary debt, $150,000 Receipts in 1878, $1,200,100 01, and expenditures $1,273,376.71 = deficit $73,276.70. Cash in treasury, $157,256.20. Valuation, $224,565,369, rate of tax 3 mills = $673,696.07. Valuation per capita, $344.79. Tax per capita, $1.03.

Portland, port of entry and the leading commercial city of *M.*, is situated on a peninsula at the western extremity of Casco Bay; lat. 43° 39′ 52″ N., lon. 70° 13′ 34″ W. The harbor is capacious and safe, and among the best on the Atlantic coast. It is protected by islands from storms, seldom obstructed by ice, and has a good entrance.

Maine Central R.R. Co. runs from Portland to Bangor, Me., 136.50 m. Branches from Cumberland Junction to Waterville, 73 m.; from Brunswick to Lewiston and Bath, 32 m.; from Crowley's to Farmington, 47 m.; and from Waterville to Skowhegan, 19 m. Leased lines, Belfast and Moosehead Lake R.R., 33.50 m.; and Dexter and Newport R.R., 14 m. Total length of line operated, 355 m. This Co., whose offices are at Portland, is the consolidation (in 1862) of the An-

Fig. 337.—Maize.

droscoggin and Kennebec and the Penobscot and Kennebec R.R. Cos., to which were added in 1873 the Portland and Kennebec, the Somerset and Kennebec, and the Leeds and Farmington R.R. Cos. Capital stock, $3,603,300; funded debt, $8,708,942.

Main-Mast, the chief or middle mast of a ship; the after-mast of a brig.

Main-Sail, the lower course, or largest sail in a ship; that set on the main-yard, and extending towards the deck.

Main-Sheet, the rope attached to the lower corners of the main-sail.

Main-Spring, the going spring of a watch or other spring-driven instrument.

Maintenance, support, as of seamen, paupers, prisoners, or apprentices.

Main-Top, the resting-place, or junction between the main-mast and the main-top-mast.

Main-Yard, the largest, or principal yard in a ship; that on which the main-sail is extended.

Maize, or **Indian Corn** [Fr. *blé de Turquie;* Ger. *Türkisch korn, Mays;* It. *grano Turco, grano Siciliano;* Sp. *trigo de Indias, trigo de Turquia*], a most valuable grass, *Zea mays* (Fig. 337), too well known in this country to necessitate here a particular description. *M.* is supposed to be indigenous to South America, and was the only species of grain cultivated in the New World previous to its discovery. It has the widest geographical range of all the cerealia, growing luxuriantly at the equator, and as far as the 50th degree of N. and the 40th of S. latitude. Its culture has spread with astonishing rapidity; being now extensively grown in most Asiatic countries, in all the southern parts of Europe, and in some of our Western States, where, owing to perfected machinery, and to the great fertility of the soil, which permits to take crops year by year without manure, it can be raised at a very low cost. The following table shows the product, acreage, and value of the crops for the year 1878 in each of the United States: —

States.	Bushels.	Acres.	Value.
Maine	2,180,000	54,500	$1,417,000
New Hampshire	2,207,400	56,600	1,346,514
Vermont	2,275,500	55,500	1,319,790
Massachusetts	1,260.000	35,000	781,200
Rhode Island	268,800	8,400	142,464
Connecticut	2,220,000	75,000	1,376,400
New York	25,020,000	695,000	12,510,000
New Jersey	9,792.000	272.000	4.406,400
Pennsylvania	44.065,000	1,259,000	21,151,200
Delaware	4,500,000	180,000	1,755,000
Maryland	11,209,500	477,000	5,044,275
Virginia	18,200,000	1,040,000	7,826,000
North Carolina	22,603,200	1,662,000	10.171,440
South Carolina	12,276,000	1,320,000	6,629,040
Georgia	24,398.000	2,218,000	14,882,780
Florida	2,124,000	236,000	1,550,520
Alabama	23,928,000	1,994,000	14,117,520
Mississippi	19,474,000	1,498,000	12,463,360
Louisiana	16,875,200	848.000	10,125,120
Texas	58,396,000	2,246,000	25,694,240
Arkansas	22,992,000	958,000	11,036,160
Tennessee	37,422,700	1 939,000	15,343,307
West Virginia	10,118,400	372,000	4,249,728
Kentucky	45,922,100	2,023,000	18,368,840
Ohio	108,643,700	3,113.000	35,852,421
Michigan	31,247,700	835.500	11,874,126
Indiana	138,252,000	4,215.000	37,328,040
Illinois	225,932,700	8,337,000	56,483,175
Wisconsin	36,900,000	984,000	10,701,000
Minnesota	17,106,900	449,000	4,961,001
Iowa	175,256.400	4,686,000	28,041,024
Missouri	93,062,400	3,552,000	24,196,224
Kansas	81,563,400	2,406,000	15,497.046
Nebraska	54,222,000	1,291,000	8,675 520
California	3,467,250	100.500	2,080.350
Oregon	166,500	5,000	153,180
Nevada, Colorado, and Territories	2,670,000	89,000	1,602,000
Total	1,388,218,750	51,585,000	$441,153,405

The production, acreage, and value of the corn crops of the United States from 1869 to 1878, inclusive, was as follows:—

Years.	Bushels.	Acres.	Dollars.
1869	874,320,000	37.103,245	658,532,700
1870	1,094,255,000	38.646.977	601,839.030
1871	991,898,000	34,001,137	478,275.900
1872	1,092,719,000	35,526,836	435,149,290
1873	932,274,000	39,197,148	447,183,020
1874	850,148.500	41,036,918	550,043,080
1875	1,321,069,000	44,841,371	555.445,930
1876	1,283,827,000	49,033,364	475,491,210
1877	1,342,558,000	50,369,113	480,643.400
1878	1,388,218,750	51,585,000	441,153,405

The stalk of *M.* is jointed like the sugar-cane. The straw, as the grain itself, makes excellent fodder. Bread-corn is liked by some; but though it abounds in mucilage, it contains little or no gluten, is more difficult of digestion than some other grains, and is not likely to be much used by those who can procure wheaten bread. *M.* is more easy of digestion when unripe, and in the Northern States the varieties called *sweet corn* are raised for eating as *green corn*, enormous quantities of which are supplied to our markets during the season. Green corn is also preserved in cans, or dried, for use in winter-time. *M.* is also largely used in the form of meal, to make cakes, of which there are a great variety. See, besides, HOMINY, POP-CORN, STARCH (CORN), etc. — *M.* is one of our staple articles of export. The following table exhibits the amount and value of exports for the year 1879, and the names of the principal countries to which exported: —

Countries to which exported.	Maize, or Indian Corn.	
	Bushels.	Dollars.
Belgium	1,341,946	606,507
Denmark	1,136,462	542,199
France	2,564,226	1,141.239
Germany	3,894,311	1,826,611
England	37,578,395	18,063,122
Scotland	2,699,999	1,427,509
Ireland	24,227.917	11,393,306
Canada	7,180,256	2,765,344
Italy	974,326	489,192
Portugal	1,343,269	654,026
All other countries	3,355,145	1,746,065
Total Indian Corn	86,296,252	40,655.120
Total Indian Corn Meal (barrels)	397,160	1,052,231
Grand Total	....	41,707,351

Maizena, a fine sort of meal of farina, prepared from maize, or Indian corn.

Majolica Ware, a peculiar kind of fine pottery (not porcelain), which was first made at Pesaro, Italy, in the 15th century, and of which the manufacture was continued with some energy for two centuries. It is supposed that Raffaelle, and it is well known that other eminent painters, prepared designs for the chief articles made; this gave an artistic tone to the manufacture. The name *Raffaelle ware* is, in fact, sometimes given to *M.* One of the celebrated potters of that part of Italy, Della Robbia, invented a beautifully white, durable, enamel glaze. Another, Giorgio, succeeded in finding such combinations of mineral colors as enabled him to produce ruby and golden tints with a peculiar iridescent lustre. Such specimens of Giorgio's *M.* as still exist command enormous prices. Another great improver of this ware was Fontana, about three centuries ago. After his time the excellence of the production fell away, and soon afterwards the manufacture ceased at the place of its birth. The name *M.* is a corruption from *Majorca*, into which island the Moors introduced the manufacture of a peculiar ware very brilliantly decorated in colors. The potters of Staffordshire, England, have recently succeeded in reproducing *M.* ware, and slabs, friezes, tablets, vases, flower-pots, etc., are now extensively made of it.

Majorca. See SPAIN.

Malacca (Straits of), a channel of the E. seas, extending from lat. 1° to 6° N., lon. 98° to 104° E., between the Malay Peninsula on the N. E. and the island of Sumatra on the S. W. Its length, N. W. to S. E., may be estimated at about 575 m.; its breadth varies from 25 m. opposite the Naning

territory, to nearly 200 m. at its N. extremity. This channel, which is very secure, is the route most usually followed by European vessels proceeding eastward to Chinese and neighboring points.

Malachite, a peculiar variety of green carbonate of copper, found in a few localities in Siberia and S. Australia. It is softer but heavier than marble, and much more difficult to work. It can rarely be found in masses weighing more than from 10 to 20 lbs.; and the finer specimens have a very high value. It breaks so readily that it is generally pieces of only two or three pounds' weight that can be brought safely to light from the mines.

The production of large doors, or vases, or other articles in this substance is exceedingly difficult. The fragments of *M.* are first sawn into thin plates, the thickness of which varies from a twelfth to an eighth of an inch. The cutting is effected by vertical circular saws, controlled by very delicate machinery, and moistened with sand and water. For curved surfaces, the *M* is cut by bent saws of a peculiar kind, the working of which is extremely precarious and difficult. The *M.* has markings in different tints of green, which give to the material no small part of its beauty. The artistic workman determines what convolution or pattern these markings shall present in the finished article; and he so selects the veneers or small pieces as to attain that end. The pieces are cut at the edges to join with great nicety; and to make these joints accord better with the markings, they are often made curved. The grinding of the edges is effected by the aid of rapidly-revolving copper wheels. The substance on which the *M.* is veneered is generally iron or copper, but sometimes stone or marble. When the pieces have been fixed down with cement, small interstices are filled up with a cement mixed with fragments of *M.*, and colored with a powder of the same material. After this the surface is ground and polished. The price of the raw M., in average pieces as brought up from the mine, is about $3.50 to $4 per pound; but very great waste occurs in the working; and this, coupled with the lengthened time required in the working, will account for the great costliness of doors, vases, etc., made in this material.

Malachite Green, a pigment. See BICE.

Malaga. See SPAIN.

Malaga Wines. See SPANISH WINES.

Malaguetta Pepper. See GRAINS OF PARADISE.

Malambo Bark, MATIAS BARK, a bark found in the United States of Colombia, possessed of bitter, strong, and aromatic properties, the produce of *Croton malambo.*

Malayan Islands, INDIAN ARCHIPELAGO, or EASTERN ISLANDS; an archipelago lying betwixt the continents of Asia and Australia, and stretching from the W. extremity of Sumatra to the Island of Papua or New Guinea; nearly all of them, with the exception of the Philippines, being situated within 10 degrees of the equator on each side. Among them are 2 islands of the first rank and size, viz., Borneo and Sumatra; of the second rank, Java; of the third, Celebes, Luzon, and Mindanao; and of the fourth rank, Bali, Lombok, Sumbawa, Jindana, Flores, Timor, Ceram, Booro, Gilolo, Negros, Samar, Mindoro, Panay, Leyte, and Zebu. The smaller ones are numberless. Population vaguely estimated at 15,000,000.

The Eastern or Malayan Islands are the only portions of Asia situated under the equator, and, like other tropical countries, enjoy heat, moisture, and a luxuriant vegetation. They are throughout of a mountainous nature, and the principal chains volcanic. There is a general uniformity in climate and in productions; but on a closer view it is found that the western and eastern divisions possess distinct characters. In the western division the productions are of a higher order of utility, and rice forms the principal food of the inhabitants. The eastern is less fertile, and the inhabitants derive their chief sustenance from the pith of the sago-tree. The portion of the latter, however, betwixt lon. 124° and 130° E. excels in the finer spices; and in this part the character of the monsoons is reversed; the easterly monsoon being here rainy and boisterous and the westerly, dry and temperate. There are two aboriginal races of inhabitants in the archipelago,—a brown people, with lank hair, (Fig. 338) inhabiting chiefly the W. division; and a negro race, black, with frizzled hair, inhabiting chiefly the E. division; the former displaying nearly the same superiority over the latter that the whites do over the negroes of Africa. The higher departments of commerce are conducted by foreigners, mostly Chinese, Europeans or their descendants, and natives of India and Arabia. Of the Asiatic traders, the Chinese are by far the most useful, and appear to stand nearly in the same relation to the natives that the Jews did to the barbarians of Europe in the Middle Ages; the advantage in respect of treatment being, however, decidedly in favor of the former. The Eastern Islands, and more especially the Moluccas, or Spice Islands, have, at different periods, been the subject of rivalry and contention among the Portuguese, English, Spanish, and Dutch. The Portuguese having, by degrees, been shorn of their maritime power, and the attention of the English gradually absorbed by their immense empire on

Fig. 338.—TYPE OF THE MALAY RACE.

the continent of India, these islands (excepting the English settlements in the Straits of Malacca) have long been occupied only by the Spanish and Dutch. The Spanish possessions are the Philippines. The Dutch have entirely subdued Java, the Moluccas, and some others, and hold military occupation of leading positions throughout the archipelago, over the whole of which, indeed, excepting the Philippines, they claim a kind of sovereignty. Gold is universally diffused throughout these islands. It is most abundant in Borneo, then in succession in Sumatra, Celebes, and Luzon; silver, as an article of commerce, scarcely exists; iron is also rare; copper ores are found in Sumatra, Timor, and at Sambas in Borneo. Banca possesses tin mines which appear to be inexhaustible; they are worked by Chinese employed by the Dutch. On the S. and W. coasts of Borneo the diamond is found. The vegetable productions are of the most varied description; many of them are common to all tropical countries, but not a few are peculiar to these regions alone. Java is accounted the rice granary of the archipelago, and it besides produces coffee and sugar in large quantities, with some indigo. Black pepper is produced in greater abundance in Sumatra, particularly on the W. coast, than in all the rest of the world. The nutmeg and clove exist throughout almost the whole of the Moluccas. The chief other productions of these islands and the adjoining seas are timber, bamboos, rattans, antimony, camphor, benzoin, tripang, birds'-nests, shark-fins, and tortoise-shell. The fisheries are valuable, particularly in the seas of the western parts of the archipelago. The commerce of the Eastern Islands is considerable. An intercourse has always subsisted with the remote maritime nations of Asia, but the most extensive has always been with China. The intercourse with Europeans is effected chiefly through the medium of Batavia and Singapore, the two great emporiums of the Eastern Islands. The imports received from China in exchange for the productions of the archipelago consist principally of tea, cotton stuffs, and porcelain, all of inferior quality, and from Europe, cotton manufactures, particularly chintzes of moderate fineness and gaudy patterns, white cottons, cambrics, and imitation bandanas; also light cheap woollens of showy colors, and low-priced glassware, mirrors, and earthenware. Under the heads JAVA, MOLUCCAS, PHILIPPINES, SINGAPORE, and SUMATRA, a fuller account is given of the islands more particularly under the European influence. The chief other islands are the following:—

Borneo, next to Australia the largest island in the world, discovered by the Portuguese in 1521, is situated between lat. 7° 4′ N. and 4° 10′ S., and lon. 108° 50′ and 119° 20′ E. It is about 800 m. in length and 600 in breadth, and contains an

area of about 290,000 sq. m., divided by the equatorial line into two portions, nearly equal in surface. The population is probably about 1,750,000, consisting chiefly of Malays, Dyaks, Kyans, Papus or Negritos, Chinese, and Bugis (natives of the Celebes). Rather more than two thirds of the island is included within the Dutch possessions in the East Indies. The mineral kingdom includes gold, silver, diamonds, antimony, quicksilver, iron, tin, and coal; the latter abundant. The principal imports are opium, tea, cottons, cloths, hardware, brass, iron, etc.; exports: sago, beeswax, edible birds'-nests, camphor, hides, rattans, tortoise-shell, trepang, cinnabar, antimony, coal, diamonds, and gold. *Dutch Towns:* Sambas, Pontiana. *Native Towns:* Borneo, Montradok, Mampanwa, Banjarmassin, Pasir Town.

Celebes. Chief Towns: Macassar, Kema, Gonnong, Tela, Bool, Palos, Waja, Tannete, Mero, Boola, Comba.

Male-Fern, a fern, *Aspidium filix-mas*, common in most parts of Europe, and also found near Lake Superior. Its roots have astringent and emetic properties, and are used as an anthelmintic; an oil is also prepared from it.

Malic Acid, a vegetable acid, found abundantly in most acidulous fruits, but most usually obtained from the berries of the mountain-ash. Its almost only use is in the manufacture of succinic acid.

Mallard [Fr.], a small grindstone; a drake.

Malleability. Ductility is the property of being drawn out in length without breaking. This property is possessed in a pre-eminent degree by gold and silver, as also by many other metals, by glass in the liquid state, and by many semi-fluid resinous and gummy substances. The spider and the silk-worm exhibit the finest natural exercise of ductility, upon the peculiar viscid secretions from which they spin their threads. When a body can be readily extended in all directions under the hammer it is said to be *malleable;* and when into fillets, under the rolling-press, it is said to be *laminable.* There appears, therefore, to be a real difference between ductility and malleability; for the metals which draw into the finest wire are not those which afford the thinnest leaves under the hammer, or in the rolling-press. Of this fact iron affords a good illustration. Among the metals permanent in the air seventeen are ductile and sixteen are brittle. But the most ductile cannot be wire-drawn or laminated to any considerable extent without being annealed from time to time during the progress of the extension, or rather the sliding of the particles alongside of each other, so as to loosen their lateral cohesion.

Mallet, a small maul made of wood, used for calking, sewing rope, etc.

Imp. duty, 35 per cent.

Malms, a kind of brick, same as cutters. See CUTTERS.

Malmsey [Fr. *malvoisie*]. See CANARY WINE.

Malt and Malting. Malt is grain which has been subjected to artificial germination, and then dried in a kiln, processes by which its farina is mellowed or sweetened, and so fitted for the purposes of the brewer. Barley is the most suitable grain for malting, but wheat, oats, rye and corn are also used.

Imp. duty, 20 per cent.

Steeping. The first process in a malt-house is to steep the grain. This is done in a stone cistern, the water remaining on the grain 2 or 3 days or more The grain imbibes moisture and swells, carbonic acid is given off, some of the husk or skin dissolves, and the grain becomes softer and whiter. According to the quality of the grain the weight increases by steeping, as little sometimes as 10 per cent, as much in other instances as 80 per cent. — *Couching.* Removed from the cistern, the steeped grain is thrown on the floor of the malt-house in a heap called the *couch*, where it remains a considerable time. It undergoes a *sweating* process. It gives off moisture, increases in temperature, feels warm and moist to the hand, exhales an odor as that of apples, and begins to germinate at the extremity of each grain. — *Flooring.* At a certain stage in the sweating the couch is shovelled down, the grain spread in a thinner layer on the floor, and frequently turned. It absorbs oxygen, gives off carbonic acid, increases in warmth, and an evident change takes place in the meal or starch within the husk. — *Kiln-drying.* At last the grain reaches the kiln, which is a room kept heated by hot air ascending through holes in the floor from a furnace below. The malt is spread over the floor, and is gradually raised to a temperature of 120° or 140° F. It is chiefly on the management of this process that depends the classification of *pale*, *amber*, or *brown*. 100 lbs. of undried barley produce about 80 lbs. of malt; but the malt occupies more space than the barley, in the ratio of about 108 measures to 100. The whole substance of the grain is mellow, and the taste is sweet. In this condition the grain is best fitted to yield its saccharine extract for making malt liquors, whiskey, vinegar, etc. See BEER, DISTILLATION, etc.

Malta, an island in the Mediterranean, belonging to the British, nearly opposite to the southern extremity of Sicily, from which it is about 54 miles distant. Malta is about 20 m. long and 10 or 12 broad. The Island of Gozo, about a fourth part of the size of Malta, lies to the N. W. of the latter, at about 4 miles' distance; and in the strait between them is the small island of Cumino. There is a light on Gozo Island, lat. 36° 4′ N., lon. 14° 10′ E., which revolves every minute, is 400 feet above high-water mark, and is visible for 24 miles. Pop. 151,082, exclusive of the British troops and their families, numbering 9,458 in 1878.

The S. coast of Malta is rocky and inaccessible, but the ground slopes from thence to the N. side, and the island is in general flat. It possesses no rivers and few springs, and its aspect is sterile. About one half of the whole surface, however, has been subjected to cultivation. The staple produce is cotton; the chief other productions are wheat, barley, pulse, fruit, especially oranges, potatoes, salt, and cummin-seed; but the grain raised is equal only to about one third of the consumption, and very few cattle or sheep are bred. Imports, chiefly wheat and other grain from the Black Sea and Sicily; British manufactures; sugar, coffee, and leaf tobacco; live-stock, chiefly from Africa; oil and wine from Sicily and Italy; spirits, wood, coals, and cheese, with a variety of other articles. Exports, cottons, sail-cloth, and yarns of Maltese manufacture; also cabinet-work, gold and silver filigree-work, and cut stone, cigars; with re-shipments of colonial produce, grain, British manufactures, and wine. About 1,800 steamers (tonnage 1,700,000) and 3,000 sailing vessels (tonnage 550,000) annually arrive. The Maltese are expert carpenters and active seamen; and ship-building is extensively carried on, the vessels being registered as British.

La Valetta, the port, citadel, and seat of government, lies in lat. 35° 54′ N., lon. 14° 31′ E., on the N.E. coast, on a narrow neck of land forming two harbors, the whole of which is defended by stupendous fortifications. The northern harbor is solely appropriated to the purposes of quarantine The Southern or Grand Port is large, safe, and commodious, running up 1¾ miles in a S.W. direction; and the shore is so bold that a line-of-battle ship may lie close to it. On the Valetta side it is one continued line of wharves for the accommodation of merchantmen. By means of the hydraulic lift dock, which was completed in 1873, steamers and other vessels, on their India route, can be repaired without discharging their cargo. Provisions are abundant and cheap, and water is supplied from tanks. The climate, though warm, is in general salubrious, especially between Oct. and May. The "sirocco," or S.E. wind, which mostly prevails in September, is oppressive and enervating; though the "gregale," or N. E. wind, in winter, is that which blows with the greatest fury. Valetta being the principal British naval station in the Mediterranean, as well as the most advantageous point of rendezvous for steam-vessels plying between Italy, France, and England, and the Levant, to supply themselves with coals, is of great importance, both in a political and commercial view. The U. States have almost no direct trade with this port, but many American vessels are engaged in the trade of foreign countrie with Malta.

Malt-Dust, also called *cones* and *cooms*, the grains or remains of malt, sold and used as a fertilizer.

Malter, a German grain measure, varying in different localities, but usually reckoned, in the southern parts of Germany, to be equal to 3 bushels and 1¼ gallons.

Maltese Stone, a soft stone quarried in Malta, used for carving, and for making large jars, etc.

Malt-Factor, a dealer in malt.

Malt-Floor, a perforated floor in the chamber of a malt-kiln, through which the heat ascends from the furnace below, and dries the barley laid upon it.

Malt-Grinder, a machine for crushing or cutting malted barley.

Maltha, mineral tar, which is probably petroleum reduced to some degree of solidification, its consistence varying from that of a thin sirup to that of soft mortar. It is found in California, Texas, etc., and other parts of the world. Being soluble in naphtha and oil of turpentine, *M.* becomes useful in many of the arts, much less, however, than petroleum, from which, besides its greater viscidity, it is distinguished by its tendency to froth when heated.

Malt-Liquors, fermented liquors which are prepared with malt, as beer, ale, and porter.

Maltster, a manufacturer of malt.

Malvasia. See CANARY WINE.

Malwa Opium, one of the leading descriptions of Indian opium, which is inferior in quality to the Benares and Bahar kinds.

Mammee Apple, a tree of the Caribbean islands, the *Mammea Americana.* Its fruit has a sweet and very agreeable taste, accompanied with an aromatic, pleasant odor. It is made into marmalades and jams, while cordials are flavored with the bitter kernel.

Manager, a director; a superintendent; the lessee or director of a theatre.

Manchester. See GREAT BRITAIN.

Manchester and Keene R.R. runs from Manchester to Keene, N. H., 46 m. This Co. was chartered in 1864, and the road opened in 1879. Principal office at Nashua, N. H. Capital stock, $500,000; funded debt, $500,000, consisting of 1st mortgage bonds payable in 1896, semi-annual interest 6%, in January and July.

Manchester Goods, a commercial term applied to cotton yarn, cotton, thread, plain and printed calicoes, velveteen, silk goods, mixed cotton and silk fabrics, and other articles manufactured in or near Manchester, England.

Manchineel, a large tree, the *Hippomane mancinella*, a native of the West Indies, the wood of which is hard and durable, very close, yellow-brown, and beautifully clouded. The sap is, however, a most deadly poison.

Mandandoo, a mixture of the buds and roots of an aromatic plant, used in Ceylon in the preparation of betel.

Mandataire, a French agent or attorney.

Mandeel, a name in Turkey for black and colored cotton handkerchiefs.

Mandel, a term in Germany for 15 articles of any kind.

Mandilion, a loose garment; a sleeveless jacket

Mandioc, a Brazilian name for the root and starch of the cassava. See CASSAVA.

Mandola [It.], a cithern, a musical instrument. — An almond.

Mandolin, a musical instrument of the lute species. The body of the *M.* is shaped like a shell, formed of a number of narrow pieces of different kinds of wood, bent into shape and glued together. On the open portion of the body is fixed the sounding-board, with a finger-board and neck like a guitar. The Neapolitan *M.*, which is the most perfect, has four double strings, which are tuned, beginning with the lowest, G, D, A, E. The Milanese *M.* has five double strings, tuned G, C, A, D, E. The sound of the *M.* is produced by a plectrum in the right hand, while the left hand produces the notes on the finger-board.

Mandore, a four-stringed lute.

Mandrel, the spindle which carries the centre-chuck of a lathe, and communicates motion to the metal to be turned. In small lathes it is driven by a pulley.

Manége, a French riding-school.

Maneguin, an artist's model of wood or wax.

Manganese, a metal which, when pure, is of a grayish white color, like cast-iron, and has a good deal of brilliancy. Its texture is granular; it has neither taste nor smell; it is softer than cast-iron, and may be filed; its specific gravity is 8. It is very brittle, and can neither be hammered nor drawn out into wire. Its tenacity is unknown. When exposed to the air, it attracts oxygen with considerable rapidity. It soon loses its lustre, and becomes gray, violet, brown, and at last black. These changes take place still more rapidly if the metal be heated in an open vessel. *M.* is found in several parts of the U. States, and mines of it have been worked in Vermont, Massachusetts, New Jersey, North Carolina, and Virginia. It is largely used in the metallurgy of iron and steel, and the ore called franklinite is employed in this country in the manufacture of crystalline burglar-proof iron and spiegel-iron. The *protoxide* of this metal is a dingy green powder, and is the basis of most of the manganese salts. The *sesquioxide* is a blackish-brown powder that gives a violet tinge to glass. The *peroxide*, or *black oxide*, is the most prevalent ore of *M.*; in various forms of preparation it is used in producing oxygen gas, in making bleaching powder, and in giving a black color to earthenware. The *sulphate* is used in dyeing and calico-printing for the color called *manganese brown.* There are many other combinations of the metal; but these are the principal which have been usefully applied in the arts. *Imp.* free.

Mangle, a machine in which damp clothes are smoothed by roller pressure. The common *M.* consists of an oblong rectangular wooden chest, filled with stones, which load it to the degree of pressure which it is required to exert upon two cylinders on which it rests, and which, by rolling backwards and forwards over the linen spread upon a smooth surface beneath, render it smooth and level. It is worked by the hand, the moving wheel being furnished with teeth upon both surfaces of its periphery; and, having a notch cut out at one part, allows a pinion, uniformly driven in the direction, to act alternately upon its outside and inside, so as to cause the reciprocating motion of the chest. There are several varieties of patent *M.*, among which may be mentioned one in which the linen is rolled round a cylinder revolving in stationary bearings, and pressed downwards by heavy weights hung upon its axis, against a curved bed made to slide backwards and forwards, or alternately from side to side.

Mangling. See BLEACHING.

Mango, a tropical fruit, the produce of trees of the *Mangifera* family (Fig. 339), of which there are many cultivated varieties in the West Indies, although only two distinct species of tree. The fruit of the finer kinds have a rich perfumed grateful flavor, while others are so stringy and unpleasant as not to be eatable. The fruit, which is usually about as large as a goose-egg, is pickled and preserved, and made into a chutney.

Mango-Ginger, an Indian name for the *Curcuma amado*, used as an article for seasoning food.

Mangosteen, the most delicious of the East-Indian fruits, the produce of *Garcinia mangostana.* It is about the size and shape of an orange; the

inside, which is white or rose-colored, is divided into several cells containing a soft and juicy pulp of a delicious flavor partaking of the strawberry and the grape. The rind of this fruit furnishes small quantities of gamboge.

Fig. 339. — MANGO.
(*Mangifera Indica.*)

Mangrove, a tropical tree frequenting the borders of seas and swamps, the *Rhizophera mangle*, the bark of which is used for tanning in the West Indies. The fruit is said to be sweet and edible; its fermented juice makes a kind of light wine. The wood is used for making sugar hogsheads, and for ship-building.

Manhattan, a fire-insurance Co., located in New York City, organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $250,000; net surplus, $140,928.98; premiums, $595,127.81; premiums received since the organization of the Co., $4,843,960.84; losses paid, $2,809,743.46; cash dividends paid to stockholders, $210,000.

Manhattan Island. See NEW YORK.

Manhattan Life Insurance Co., located in New York City, organized in 1850. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $100,000; assets, $10,049,156; liabilities, $8,199,495; gross surplus, $1,849,660; policies in force, 11,416, amounting to $33,332,618; premiums, $993,671; dividends paid to policy-holders, $250,556.

Manifest, in Commercial Navigation, a document signed by the master, containing the name or names of the places where the goods on board have been laden, and the place or places for which they are respectively destined; the name and tonnage of the vessel, the name of the master, and the name of the place to which the vessel belongs; a particular account and description of all the packages on board, with the marks and numbers thereon, the goods contained in such packages, the names of the respective shippers and consignees, as far as such particulars are known to the master, the names of the several passengers on board, the baggage belonging to them, etc. The *M.* must be made out, dated, and signed by the master or commander, at the place or places where the goods, or any part of the goods, are taken on board. "A ship or vessel being without such *M.*, unless lost, is liable to a penalty and forfeiture of an amount equal to the value of such merchandise not included in the *M.* On the arrival of any vessel within four leagues of the coast, or within any of the navigable waters of the U. States, the master of such vessel, upon demand of any officer of the customs who may first come on board the vessel, must produce to him the *M.* and deliver to him a copy, which the boarding officer is to certify and transmit to the collector of the district to which the merchandise is consigned. No clearance can be granted to any vessel bound to a foreign port until the master, or person having charge thereof, shall, under oath, deliver to the collector of the district from which such vessel is about to depart, a *M.* of all the cargo on board the same and the value thereof. Licensed coasting vessels trading between two districts must be provided with *M.*; but if trading between different ports in their home district, none is required. *M.* may be made out in foreign languages, — the language of the port from which the vessel sails." — *T. McElrath.* See IMPORTATION.

Manifold-Writer, a writing apparatus for taking several copies of a letter or document at once by a stylus, upon thin tissue or tracing paper interleaved with black oiled sheets.

Manila. See PHILIPPINE ISLANDS.

Manila Hemp, a name given in commerce to the fibre of the wild plantain or abaca, *Musa textilis*, a tree native of the Philippine Islands, closely allied to the banana. The fibre is obtained from the petioles. The outer petioles yield coarse fibres, from which is made a fabric called *bandala*, but is chiefly used for making the white ropes and other cordages so much prized for their tenacity and durability. From the inner petioles is obtained a much finer fibre, from which the inhabitants of the islands weave the fine muslins known as *M.* handkerchiefs and *M.* scarfs, and other tissues which are almost transparent, somewhat rigid, light, and cool to the touch. Large quantities of paper, possessing great toughness in proportion to its weight, are made from the worn-out *M.* rope.

Manilas, a name for a kind of cheroots made in the Philippines, so called from the name of the city from which they are shipped. Tobacco being a monopoly of the government, cigars are made at government factories, and a fixed price is put upon them, at which they are sold by agents of the government. They are largely exported to England and France, but only occasionally to this country.

Manila-Nut, another name for the ground-nut, *Arachis hypogæa.*

Manipulator, the transmitting instrument attached to the dial telegraph.

Manive. See CASSAVA.

Manna [Fr. *manne;* Ger. *Mannaesche;* It. *manna*], the concrete juice of the *Fraxinus ornus* (Fig. 19), a species of ash growing in the South of Europe. The juice exudes spontaneously in warm, dry weather, and concretes into whitish tears; but the greater part of the manna of commerce is obtained by making incisions in the tree, and gathering the juice in baskets, where it forms irregular masses of a reddish or brownish color, often full of impurities. *M.* is imported in chests, principally from Sicily and Calabria. The best is in oblong pieces or flakes, moderately dry, friable, light, of a whitish or pale yellow color, and in some degree transparent; the inferior kinds are moist, unctuous, and brown. It has a slight peculiar odor, and a sweet taste, with some degree of bitterness not very pleasant, and leaving a nauseous impression on the tongue. *Imp.* free.

Mannheim Gold, or **Similor**, an alloy of 3 parts of copper and one of zinc. A little tin is sometimes added, which, though it may improve

the color, impairs the malleability of the alloy. It is from this that the spurious leaf-gold, laces, and other articles are manufactured.

Manometer, an instrument intended to measure the rarefaction and condensation of elastic fluids in confined circumstances.

Manoscope. Same as manometer.

Man-Ropes, side-ropes to the gangway of a ship.

Mansana, a division of land in some parts of Central America, equal to 100 Spanish or 88⅝ English sq. yards.

Mansard [Fr.], an attic or garret with a curved roof, so called from Mansard, the architect who introduced it.

Mansion, in England, a large dwelling; a manor-house.

Mantel-Piece, a projecting beam or ledge in a room, resting on the jambs of a fireplace. Mantel-pieces are of wood, marble, slate, or iron.

Mantilla, a small mantle. — A veil worn by females (especially in Spanish-speaking countries), covering the head, and hanging down upon the shoulders.

Mantle, a lady's wrapper or cloak.

Mantua-Maker [a corruption from the Fr. *manteau*], a sempstress; a maker of women's dresses and gowns.

Manual, a hand-book or instruction-guide; a book of reference.

Manufactory, a building where a manufacture or trade is carried on.

Manufacture, a commodity produced from raw or natural materials by the help of tools or by machinery. See MANUFACTURING.

Manufacturer, one who works up a natural product into an artificial commodity.

Manufacturers' and Builders' Fire-Insurance Co., located in New York City, organized in 1870. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $182,909.16; premiums, $128,364.95; premiums received since the organization of the Co., $795,990.27; losses paid, $160,358.08; cash dividends paid to stockholders, $164,000.

Manufacturers' Fire and Marine Insurance Co., located in Boston, Mass., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; net surplus, $253,084.09; premiums, $198,139.69; premiums received since the organization of the Co., $3,226,742.01; losses paid, $1,865,463.82; cash dividends paid to stockholders, $275,000.

Manufacturers' Insurance, a fire and fire-marine insurance Co., located in Newark, N. J., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $14,491.62; premiums, $136,292.80; premiums received since the organization of the Co., $811,534.80; losses paid, $357,334.58; cash dividends paid to stockholders, $275,000.

Manufacturing. Tools and machines have in common one important principle, whose application constitutes the very essence of the modern process of manufacturing as distinguished from the slow and laborious mode of making things by hand. The principle will be easily understood by a simple example. Let it be required to draw straight lines across a sheet of paper. Few persons can take a pen or pencil and do this with even an approach to accuracy; and at best they can do it but slowly and imperfectly. But with the aid of a ruler any number of straight lines may be drawn rapidly and surely. The former case is an instance of *making by hand*, the latter represents *manufacturing*, the ruler being the tool or machine. Let it be observed that the ruler has in itself the kind of form required, — that is to say, straightness, — and that in using it we copy or transfer this straightness to the mark made on the paper. This is a simple example of the *copying principle*, which is so widely applied in machines for manufacturing; for, in all of these, materials are shaped or moulded by various contrivances, so as to reproduce certain definite forms, which are in some way contained within the machine itself.

Manufacturing Chemist, a working chemist; one who has a laboratory and prepares chemicals, etc.

Manure, any vegetable, animal, or mineral matter introduced into the soil, either for the purpose of improving its texture, or for directly nourishing the plants which grow in it. Considered in their manufacturing relations, *M.* are now becoming a large and important item in our national industry, irrespectively of any scientific theories as to their relative usefulness in agriculture. Cattle-dung and farm-yard refuse are the natural *M.* first applied to use; but the manufacture of *artificial M.* is every year assuming proportions of greater and greater magnitude. Beginning with the present century, there have been the following among many compositions proposed, and more or less brought into use. — Pounded oyster-shells and gypsum; night-soil, calcined river-mud, and any soil or sediment containing carbon, rags of woollen, silk, and even leather clothing; the waste of manufactures in which horn, bone, hides, bristles, intestines, and other organic and nitrogenized materials are used, the spent animal or bone charcoal of sugar refineries; the ammoniacal liquors of gas-works; the alkaline wash-waters of soap, dye, bleach, and other factories. Almost numberless matters have in this manner found their way into patented artificial *M.* The suggested modes of preparation are numerous, mechanical and chemical; such, for example, as concentration by boiling down, precipitation by chemical agency, crushing, grinding, chemical disintegrating by powerful solvents, maceration in water, torrefaction by fire, and digesting in superheated steam. *Superphosphate of lime*, first patented in 1842, has become a highly-valued *M.* Bone and minerals, if containing phosphoric acid, are made to yield it for purposes of *M.* They are first ground to a fine powder by millstones, the powder is passed into a long iron cylinder having agitators revolving within it, sulphuric acid is admitted, the acid and the powder, forming together a kind of mud, pass out of the cylinder; the semi-fluid mass runs into deep pits, where it is left until it gradually solidifies. Bones, fossil bone earth, or coprolite, bone ash, animal charcoal, etc., are rendered available in the production of phosphate of lime. One important kind of *M.*, *guano*, is not a manufacture; it consists of the droppings or refuse of sea-birds on lonely coasts and islands in S. America. (See GUANO.) Other natural and artificial *M.* are also noticed under their separate heads. *Imp.* (all substances expressly used for M.), free.

Manure-Distributor, an implement used for distributing manure easily and at regular distances. It is usually combined with the ordinary corn-drill, so that the corn and manure are delivered together. The machine is generally so arranged that the manure can, at the pleasure of the cultivator, be deposited, not only from 2 to 3 inches deeper in the ground than the seed, but from 10 to 12 in advance of it, so as to give the soil

time to cover the manure before the next coulters deposit the seed.

Manuscript, a book or paper written by the hand; a written, in contradistinction to a printed, document. *Imp.* free.

Many-Roots, a name for the *Ruellia tuberosa*, a native of the West Indies, the roots of which are emetic.

Manzanilla, a wine drunk in the Philippines.

Map, a delineation of the surface of the earth, or part of a country, with its position, boundaries, and geographical peculiarities defined.

Fig. 340. — Sugar-Maple.

Maple, a timber-tree of which there are many varieties. The sugar-*M.*, *Acer saccharinum* (Fig. 340) also called *M. orchard*, and *rock-M.*, is one of the most noble and majestic of American trees. In favorable situations it sometimes grows to a height of 70 or 80 feet, and from 2 to 4 feet in diameter, but usually it does not exceed an elevation of 50 or 60 feet, and a diameter of 12 or 18 inches. The trunk is generally straight, though often studded with projections and excrescences. In all healthful and vigorous trees the outward bark is light-colored, by which they may readily be distinguished. When growing in open situations, with room to spread on every side, where all its branches are exposed to the free action of light, this tree is an object of great beauty. It somewhat resembles the European oak in its outline, in the form of its trunk and disposition of its branches, and in the dense and massy character of its foliage.

The wood of the *Acer saccharinum*, when newly cut, is white, but after being wrought and exposed for some time to the light it takes a rosy tinge. Its grain is fine and close, and when polished its lustre is silky. It is very strong and heavy, but wants the property of durability, for which the European and American white oaks are so highly esteemed. The northern wood, when dry, weighs 46 pounds to a cubic foot, but that grown south weighs much less. When cut and properly dried it makes excellent fuel. When exposed to the alternations of moisture and dryness it soon decays, and for this reason it is not much used in civil and naval architecture. The wood of the *M.* exhibits several accidental forms in the arrangement of its fibre, of which cabinet-makers take advantage in manufacturing beautiful articles of furniture, such as bedsteads, writing-desks, and other fancy works, and for inlaying mahogany and black walnut in bureaus, piano-fortes, etc. The principal of these forms or varieties are: 1. The *Curled M.* The undulations or medullary rays of this variety are lustrous, and in one light appear darker, and in another lighter than the rest of the wood. Sometimes the zig-zag lines are crossed by beautifully colored veins; but, unfortunately, the lustre of these shades disappears by long exposure to light and air. — 2. The *Bird's-eye M.* This variety exhibits small whitish spots or eyes, not exceeding a tenth of an inch in diameter, sometimes occurring a little way apart, and at others contiguously disposed. The more numerous these spots the more beautiful and valuable the wood. They are seen only in old trees which are still sound, and appear to arise from an inflection of the fibres from the centres of their trunks toward the surface across the grain. To obtain the finest effect the wood should be sawed as nearly as possible in a direction parallel with the concentric circles.

The sugar-*M.* tree is so called from the saccharine matter obtained by tapping its trunk in spring, which in the northern States and in Canada is largely manufactured into sugar equal to cane sugar, called *M.-sugar*, or *Canada sugar*. The extraction of *M.*-sugar is a valuable farming resource in countries where it abounds; but it is obvious that this mode of obtaining sugar is only destined for a certain stage in the progress of society, and eventually gives way to the sugar of commerce, produced by cane. For this reason we shall not detail the process of its manufacture, as it cannot be regarded as a matter of practical utility. In a country like the U. States, intersected by canals, railroads, and other channels of intercommunication, where labor is expensive and fuel is becoming more and more valuable, the manufacture of this article cannot fail to be an unprofitable occupation. Besides, the annual drawage of the sap renders the trees sickly and causes a premature decay. The production of *M.* sugar depends very much upon the circumstances of the market. Its manufacture is not a regular business like that of cane, but is prosecuted or not, very much to suit the convenience of the farming population among whom the sugar orchards lie. Nothing but a very high price of sugar stimulates a large production of *M.* Of late, however, the manufacture of this sugar has been revived by the introduction of improved evaporators and other apparatus well adapted to facilitate the operation. Most of the sugar is sent to market in the form of *M.*-sirup, for which there is a large demand. According to the last census, the total products of *M.*-sugar in 28 of the U. States were 28,443,645 lbs. The States which contributed the largest amounts were: Vermont, 8,894,302 lbs.; New York, 6,692,040; Ohio, 3,469,128; New Hampshire, 1,800,704; Pennsylvania, 1,545,917; Indiana, 1,332.332; Virginia and West Virginia, 755,699; and Wisconsin, 507,192.

Maquila, a term used in Mexico for reducing ores for mine-owners who do not possess mill-power, and for which a certain sum, according to agreement, is paid by the mine-owner to the proprietors of the reduction establishment.

Fig. 341. — Marabou.

Marabou-Feathers, the under tail-coverts of the *Ciconia argala* and *C. marabou;* the former, the adjutant-crane of tropical India (Fig. 341), furnishes the best; the latter inhabits Africa and Asia; both birds are very large, being sometimes six feet high. The feathers are very light, and are much worn for head-dresses, the white kinds being exceedingly valuable.

Maracauba, a furniture-wood imported from Brazil, in appearance between mahogany and tulip-wood.

Maracaybo See VENEZUELA.

Marajah, Maharajah, a Hindoo sovereign prince.

Maranhao. See BRAZIL.

Maraschino, a liqueur prepared in Italy and Dalmatia from a variety of cherry called *marasquin*. The fruit and seed are crushed together, one part to the hundred of honey added, and the whole subjected to fermentation, and then distilled and rectified. Sugar and water are subsequently added to flavor it, and it is then stored for some months to free it of empyreumatic flavor.

Maravedi, a Spanish copper coin and petty money of account, the 6th of a penny and the 272d part of the dollar: 34 maravedis make a real, which is the legal money of account.

Marble, a term generally applied to the varieties of limestone that can be obtained in large sound blocks, and are susceptible of a good polish. *M.* is found in beds in various geological formations. It greatly varies in color, texture, and structure, and also in durability, but its composition is for the most part essentially the same; it is a carbonate of lime or a combined carbonate of lime and carbonate of magnesia, burning readily to quicklime. *M.* is soft, and easy to work with the chisel or hammer; sp. gr. about 2.7, making the weight of the cubic foot about 169 lbs. It has been employed in all civilized nations for the internal and external decoration of buildings constructed of this or other material, and it has been the favorite, and almost the only, stone used by the sculptor.

Italy has long been the principal *M.*-producing country in the world; the far-famed quarries of Carrara having from time immemorial supplied statuaries with this beautiful material, which is of a texture like loaf-sugar. The principal quarries of the district are at Carrara, Massa, and Seravezza, and produce between 40,000 and 50,000 tons per annum of white and colored *M.* La Spezzia, Moriti, Pisani, Campiglia, Elba, Sienna, and Cerfalco, also produce *M.* of great excellence and beauty, but in comparatively small quantities. The principal Italian *M.* are *Carrara*, pure white; *Giallo antico*, yellow, more or less veined; *Rosso antico*, blood-red, and speckled with white; *Portoro*, black, with gold rings and veins; *Bardiglio*, dove-colored, and veined; *Lumachello*, dark brown, with iridescent particles; *Cipolin*, white, with green rings and veins; *Mandeluto*, red, with yellow spots; *Brocatello di Siena*, yellow, with purple spots; *Serpentine*, various shades of green; and *Verde antico*, clouded green. Parian *M.* occurs in the island of Paros, and is almost as celebrated as that from Carrara. The former has a more wavy look than the latter, for which reason it is preferred by many sculptors for nude statues. — *M.* are commercially classified as *white* and *colored;* but each of these groups is divided into many varieties, known by distinct names. The pure white or statuary *M.*, when faultless in color and texture, is worth from $15 to $20 per cubic foot. This *M.* is found in various localities of the U. States. The quarries of West Rutland, in Vermont, furnish *M.* of exceedingly delicate texture and purity of whiteness, the blocks being large and sound, and quite as beautiful as the statuary *M.* of Carrara; it is, however, somewhat harder and more brittle than the Italian *M.* — The mottled, or clouded white *M.*, in which the mass is white with more or less clouds or stains is employed for walls, cornices, and columns of buildings, for sepulchral monuments, mantels, etc. It is worked at various places on the range of the great belt of metamorphic rocks through Canada, Vermont, W. Massachusetts, a little back of the cities of New York, Philadelphia, Baltimore, and Washington, and thence through Virginia and the Carolinas into N. Georgia and Alabama. The quarries in Massachusetts and New York furnish the *M.* for the most costly edifices of Southern cities; but white or light *M.* of desirable quality are, to this day very scarce in America, and almost all the fine white *M.*, rivalling the Italian, is obtained in Vermont, at West Rutland, Sutherland Falls, and Pittsford. — Pure black *M.*, called *Nero antico*, was largely used by Roman sculptors. Some varieties of it are found in Derbyshire, England, Kilkenny, Ireland, and in the U. States at Shoreham, Vt. — There is an endless variety of colored *M.* The *variegated M.* are those which are variously spotted, shaded, and veined Among them the most estimated and costly are the yellow *M.* of Sienna; the Italian dark-red; the black Genoese, called Portoro *M.*, which has golden-colored and white veins; and the soft, shaded, dove-colored Lisbon *M.* The best *M* of this class in this country come from California. — *Brecciated M.* seems to consist of angular fragments of various mineral substances, united in a bed or paste of calcareous cement. When the fragments are very small, breccias are called *Brocatellas*. The most celebrated *M.* of this class are the black ground spotted with white fragments, which come from the Pyrenees and different parts of France. The most beautiful of the American colored *M.* (brecciated and variegated) come from quarries in the N. part of Vermont, near Lake Champlain. They are of uniform texture, and take a high polish, but they are difficult to work. They vary in colors from deep red, traversed with veins of white, to rose-tinted flesh-color mottled with whitish spots. — *M.* containing petrified shells (sometimes so crowded as to compose the whole mass of the stone) are called *Lumachella* or *fossiliferous M.* Handsome mantels are made from the American varieties which abound in the Western States. — *Serpentine* and *Verd antique* are not true *M.* The first, which comes from Genoa and Tuscany, is a soft mineral of different shades of green, of waxy lustre, and susceptible of a high polish. It consists of about equal parts of silica and magnesia, with 12 per cent of water. It abounds in Vermont and Canada. Verd antique is a mixture of green serpentine and light-colored limestone. The best comes from Egypt. It is found in all the New England States, in New York, and in Pennsylvania.

Quarrying and Cutting. "In quarrying marble, the surface-rock, except when protected by clay or earth, is found cracked and decomposed by frost, sun, etc., to a depth of 10 to 30 feet, and is worthless. This is removed by blasting, and is discarded. The soundness and value of the marble can only be determined when the excavation has been carried beyond the reach of external agents. Even then the marble is often found to be unsound; so that the opening of marble-quarries is always expensive, and in untried territory hazardous. When the surface or 'cap-rock' is removed, a 'floor,' or level space, is formed, where the 'channelling-machines' are set to work. These machines are worked by steam, and are of two kinds, — viz., those which work one or two gangs of heavy chisels, like the 'Wardnell machine,' and those which drive the diamond drill. By these machines narrow parallel channels are cut across all the floor to the depth of perhaps six feet. The machines are then turned, and channels are cut at right angles with the first. The floor is thus cut into blocks of any required size. One of these, called the '*key-block*,' is then broken out, and the others, thus rendered accessible, are drilled through at their bases, — a process called 'gadding', — and are lifted out by cranes. No powder is used in quarrying marble in this country, as it shatters and wastes the material. The cost of cutting and raising block marble is from seventy-five cents to one dollar per cubic foot. When removed from the quarry the blocks of marble are taken to a mill constructed for that purpose, and *sawed* into slabs of different thickness or into pyramids for monuments, blocks for building, etc. This is done with gangs of horizontal saws, which are strips of soft iron, fed with sand and dripping water. The polishing of marble is also done by machinery, the slabs or blocks being placed in a 'rubbing-bed' and ground and polished with sand, emery, 'putty,' etc., by a rubber which has either a rotary or a to-and-fro motion." — *Johnson's Encyclopædia.*

According to the last census, there were in the U. States 22 quarries in operation, employing a capital of $1,316,600, and producing $804,300. For the year 1879 the value of imports of *M.* and stone (rough and manufactured) was $689,288, of which $335,306 was from Italy, and $106,152 from Scotland. The value of exports of the same was $574,305.

Imp. duty: white statuary, brocatella, Sienna, and verd antique, in block, rough or square (unmanufactured), $1 per cubic foot and 25 per cent. — Veined, and all other, n. o. p. f., 50 cts. per cubic foot and 20 per cent. — All sawed, dressed, or polished *M.*, *M.* slabs, and paving tiles, not above 2 inches thick, 25 cts. per sq. foot and 30 per cent. Each additional inch per sq. foot, 10 cts. — The same, exceeding 6 inches in thickness, as *M.* in block. — All other manufactures of *M.*, n. o. p. f., 50 per cent.

Marble-Paper. See PAPER.

Marbler, one who veins paper, paint-work, or other material in imitation of marble.

Marbles (Playing) are toys for children, made of clay baked and glazed, of alabaster, of glass, of marble, and of a hard stone found near Coburg, in Saxony, which is broken into small pieces with a hammer, and then ground in a mill and reduced to accurate smooth spheres in about a quarter of an hour. Agate *M.* are also made at Oberstein on the Nahe, in Germany, by first chipping the pieces nearly round with a hammer, and then wearing them down upon the face of large grindstones, which in some minutes bring them into the shape of perfect spheres. Immense quantities of *M.* are brought to this country from Germany.

Marbling. In the ordinary method of marbling book-edges, a trough about two inches deep is filled

with a solution of gum-senegal water. Various coloring matters, ground in spirits of wine and mixed with a small quantity of ox-gall, are thrown upon the surface of the water and disposed in the pattern desired by means of a quill and comb. The book is now tied between two boards, and the edges being dipped into the trough the colors become attached; the workman blows away the excess of gum and allows the colors to dry. They are afterward burnished. — *E. H. Knight.*

Marc, the cake or refuse after expressing the oil or juice from fruits or seeds, as of apples, olives, grapes, etc., mostly used for manure.

Marceline, a thin silk tissue called Persian.

Marcella, a quilted cotton fabric.

Marchand, a French shopkeeper or dealer.

March, in weaving, one of the short laths lead across the treadles under the shafts.

Marcobrunner. See GERMANY (WINES OF).

Marcus, a large iron-headed hammer.

Mare, the female of the horse.

Marée [Fr.], fresh sea-fish.

Mare's-milk. The milk of the mare is richer in sugar than that of the cow, and is usually employed by the Kalmucks and others for the manufacture of milk beer. By distillation, ardent spirits are obtained from this koumiss, and, when carefully made, a pint of liquor will yield half an ounce of pretty strong alcohol.

Marfil [Fr. and It.], an elephant's tusks.

Margarine, MARGARIC ACID, a fatty acid obtained from animal fat, and used in the manufacture of candles.

Margarita, an island in the Caribbean Sea belonging to Venezuela, 35 m. N. of Cumana. It is 40 m. long from E. to W.; the surface is mountainous, and the climate hot but healthy. See VENEZUELA.

Margin, the differential value of an article between cost-price and salable value. — An edge or border. — The blank unprinted sides of a book page. — In carpentry, the flat part of the stile and rail of framed work.

Margosa-Oil, a native name for the oil expressed in India from the seeds of *Melia azadirachta.*

Marielle, a kind of vessel employed at Naples in the coasting or foreign trade.

Marie-Galante. See GUADELOUPE.

Marietta and Cincinnati R.R. runs from Ludlow Grove to Belpre, Ohio, 187.30 m.; branches, 87.90 m.; leased lines, 36.80 m.; total length of line operated, 312 m. This Co., located in Cincinnati, is the consolidation of Belpre and Cincinnati, Franklin and Ohio Road, and Hillsboro' and Cincinnati R. R. Cos. It was reorganized in 1860, and purchased in 1863 the Scioto and Hocking Valley R.R., now known as the Portsmouth Branch. It was placed in 1877 in the hands of a receiver in consequence of default in payment of interest on the 4th mortgage bonds. *Financial statement:* Cap. stock, 1st preference, \$8,105,600; 2d preference, \$4,440,100; common or deferred stock, \$1,386,350; funded debt, \$11,304,000; bills payable, loans, etc., \$7,583,502. The funded debt consists of: 1st mortgage (sterling and dollar), interest 7 %, payable in 1891, \$3,500,000; 2d mortgage, interest 7 %, payable in 1896, \$2,500,000; 3d mortgage, interest 8 %, payable in 1890, \$3,000,000; 4th mortgage, interest 8 %, payable in 1908, \$2,004,000; assumed 1st mortgage of the Scioto and Hocking Valley R.R., interest 7 %, payable in 1896, \$300,000. The cost of construction and equipment is \$23,605,983.

Marigold, a genus of showy plants; the well-known common (*M. Calendula officinalis*) was formerly used in soups and broths, and employed as a carminative, but is now chiefly used to adulerate saffron.

Marigraph, an apparatus for registering, in a permanent manner, the height of the tides, etc.

Marinare [It.], to pickle.

Marine, frequenting or appertaining to the sea. A general collective name for shipping, as the mercantile *M.*, etc.

Marine-Engine. Steam-engines, for use on board ship, are affected in their shape and action by the necessity of economizing space as much as possible. By far the larger number now made are horizontal engines for screw-steamers. In this form the build is more compact, the space occupied smaller than in any other. In many of them the action is direct, the stroke and connecting-rod short, and the cylinder of large diameter. In other cases a longer stroke and connecting-rod are used. One variety, called the *duplex horizontal-trunk engine*, has the inside of the trunk made available for cylinder space by the aid of a fixed piston. Engines with concentric double cylinders, oblique screw-engines, vertical inverted cylinder screw-engines, double cylinder expansive-engines, are among the many varieties of engines now made for screw-steamers.

Marine Glue. See GLUE.

Marine Insurance is insurance against perils of the sea, including the chances of fire, piracy, and barratry. The general principles of insurance being given under INSURANCE, we propose to exhibit in this article a brief statement of the principal laws and rules which especially govern marine insurance.

Any individual, whether an American citizen or an alien, may insure his interest in a vessel, provided he be not an alien enemy. The insured must have an interest in the subject, and if the person insured part with his interest the insurance falls. The indorsement of a bill of lading to a creditor is held on the face of the transaction a transference, to the effect of terminating an insurance; the parties, however, are entitled to show that their understanding of the transaction was different. An insurable interest does not require to be a direct right of property. Any valuable interest arising from the subject, unless specially excluded (as is the case with seamen's wages), may be insured; for instance, the commission, or privileges, of the commander, and money expended by him for the use of the ship, expected profits, freight, and interest in bottomry and respondentia bonds. An owner may even insure, under the head of freight, the benefit which he derives from carrying his own goods. When freight is insured, it must be shown, before recovery, that but for the loss the vessel would have earned her freight, or that she was in the course of earning it, viz., by having her cargo on board. The wages of seamen are not insurable on ground of public policy, it being considered necessary to exclude them from any interest apart from the safety of the ship. Reinsurance, or insurance against the loss to which the underwriter may be liable, is prohibited, unless in the case of the insurer becoming insolvent or bankrupt, or dying, in which case his assignees, executors, or administrators may reinsure, provided it be set forth on the policy that it is a reinsurance. A double insurance is not void, though made with the view of double satisfaction in case of loss, but the insured cannot recover on the policies collectively more than his loss. He can either sue on both ratably, or on one, and, in the latter case, the underwriters who pay have relief against those in the other policy. As to the subject which forms the interest, in general it may be laid down as a rule, that no insurance can be made on any species of goods and merchandises intended to be imported or exported, contrary to the laws of this country or to the law of nations; and that if the intended commerce be contrary to any of these laws, an insurance made to protect it will be illegal and void. When both parties are aware of the illegality, as in other illegal pactions, neither party has an action against the other for performance of his covenant; and so, though he may have paid the premium, the insured cannot recover on a loss. It is no defence, however, in an action on a policy, that the subject-matter of the insurance has come into existence through an infringement of the revenue law of some other country. If a general insurance be effected on goods, part of which is of a nature to make the voyage illegal, and the ship and cargo liable to be seized in terms of the revenue laws, the policy is entirely vitiated; but, if no part of the cargo but that illegally conveyed is liable to

forfeiture, the insurance will be good as to the remainder. Insurance on contraband of war is void, and so on any trade carried on in contravention of an American embargo. See CONTRABAND, EMBARGO.

Risks or Perils. — Perils usually insured against are as follows: —

1. *Of the Seas.* — The expression comprehends those injuries or losses which proceed directly from natural causes, and are not designedly done by the hand of man; it embraces injury from stress of weather, winds and waves, lightning, rocks, sand-banks, etc. A loss arising from the misconduct or ignorance of the master or crew is not considered as by a peril of the sea, nor is one from the internal condition of the vessel, as where it becomes worm or rat eaten. It is a peril of the sea when the vessel receives damage by taking the ground in a dry harbor, owing to the tide having left her, or when one ship is run down by another, or when loss is immediately caused by the convulsion of the elements, though remotely occasioned by some act of carelessness. Where a vessel is driven ashore by stress of weather, and there captured, it is not a peril of the sea, but of enemies. Where two of the crew were sent on shore to make fast a rope, and were impressed before they could do so, in consequence of which the ship went ashore nearly at high water, where she grounded and was much strained, and made a great deal of water before she could be got off, it was held a loss by peril of the sea.

2. *From Fire.* — Whether occasioned by the negligence of of the master or crew, by malicious design, or in furtherance of public policy, as where a ship is burnt to prevent her from falling into the hands of an enemy. If goods are shipped in a damaged state, and internal combustion arises, the insurers of such goods are not liable.

3. *From Enemies.* — The principal losses from this source are by capture. The underwriter becomes liable from the moment of capture, and is not entitled to wait for a formal alienation of the property by condemnation or otherwise; retaining, however, an equitable right in the case of recapture, to have his responsibility reduced to the extent of the actual loss occasioned, as by salvage, etc. The underwriter will not be relieved, though he show that a capture was occasioned by connivance with the master. The only manner in which there can be a deduction from the full loss in the case of a captured vessel is in the case of recapture. Detention by embargo is one of the perils from enemies, and it is generally specified in the policy. See EMBARGO.

4. *Pirates, Rovers, and Thieves.* — This includes all those acts of violence and fraud which, not being done by governments in the course of hostilities, resemble robbery and theft on shore.

5. *Jettison*, and 6. *Barratry.* See these heads, and AVERAGE.

These particulars are usually followed in the policy by the general definition, "all other perils, losses, or misfortunes, that have or shall come, to the hurt, detriment, or damage of the said goods and merchandises, and ship, etc., or any part thereof." This general expression has become limited by practice and law to certain descriptions of loss. The destruction of the ship through any principle of internal decay, — as by worms or rats, is not covered by it. Though loss occasioned by capture be one of the risks specifically insured against, it would appear that loss occasioned where the voyage is abandoned *on account* of the risk of capture, does not come under the general clause; so it was found in England in a case where, it having been ascertained that the port of destination of an insured vessel was shut up against the British, the ship proceeded elsewhere, and sold her cargo at a loss. Where a vessel is fired on by mistake for an enemy, the loss is held to be covered by the general clause. There are some risks excluded from the insurance by what is termed the common memorandum. (See POLICY.) There are certain injuries to ship and goods which the ship-owners must bear, in relation to the former, and indemnify as to the latter, notwithstanding insurance. If the ship was not seaworthy at the commencement of the voyage, they are liable for all loss, as likewise for loss or damage arising from the defect. Seaworthiness requires reasonable soundness and strength in materials, and a full equipment of all appurtenances and implements which are necessary to the ship, with a proper master, officers and crew, and proper papers.

The Duration of the risk is a matter of importance. As to goods, if they are insured to be loaded at a particular place, they will not be covered if loaded elsewhere. Under the usual form of policy the risk does not commence till the goods are actually on board, and it may be laid down as a general rule that the risk on goods continues no longer than they are actually on board the ship mentioned in the policy, or in boats for the purpose of being landed; and that if they be removed from on board and landed or put on board another ship without the consent of the insurers, the contract is at an end, and the insurers are discharged from all subsequent responsibility. But if the vessel be disabled on her voyage, and the goods be shifted on board another to be conveyed to their destination, the insurers continue liable; so also if it be a condition that the goods are at a particular place to be transshipped into other vessels, and these other vessels not appearing, they are transferred to a store-ship. As to the ship, if the insurance be *from* the port, the risk commences when the vessel breaks ground; if *at* and from the port, it commences with her arrival at the port, or, if she is there at the time, at the execution of the policy. In the former case, however, the vessel must have arrived seaworthy, or at all events in a state to be repaired and equipped for the voyage. If the insurance be on the ship "in the same manner" as that on the goods, and the latter do not attach, the former falls with it. It is usually stipulated that the risk shall continue "until she hath moored at anchor 24 hours in good safety," and when such is the case, a loss happening after the time is not insured against, though the *cause* existed before the vessel was moored. The underwriter is indeed in all cases relieved if the loss does not actually take place till after the period fixed for the termination of the risk, though the event by which it is occasioned, and one which could not but occasion a loss, has happened before,— as where a vessel springs a leak and is kept afloat by pumping.

Premium. — The consideration on which the insurer undertakes to indemnify the insured is so termed. In marine insurance there is this peculiarity, that there is a claim on the part of the underwriter, for the stipulated premium, after receipt of it is acknowledged in the policy. This practice was first employed to exclude litigation on the ground of want of consideration in actions for loss: it afterwards became a convenient arrangement for facilitating the transactions of this department of business. The merchant has no time, at the critical moment when he wishes to insure, to make inquiry as to who will undertake the risk in the particular case; while there are capitalists ready to incur such risks of any description, at a corresponding premium. Between these two parties the insurance brokers drive their business, finding for the underwriters merchants who wish to be insured, and for the merchants underwriters who will undertake the risks. To facilitate this arrangement, the broker takes on himself the relations of debtor and creditor between the parties He keeps an account, putting down all premiums to the underwriter's credit, as already received, placing against them return premiums and losses, and settling periodically with the underwriter. It is held that the receipt does bar the underwriter's claim from the *insured*, but it leaves the claim of the underwriter against the broker, and that of the broker against the insured, open. The premium and the risk are counterparts of each other, and if the latter do not exist, the former cannot be retained. If through mistake or misinformation an insurance be accomplished where there is no interest, or on an interest far below that nominally insured for, there will be a claim for return of the whole premium in the one case, and for a proportional part in the other. If there are several policies negotiated to an extent far above the real interest, and without fraud, — as, in the case of loss each underwriter would have to pay his proportion, without regard to priority, so each will have to return a proportional part of the premium. Upon a wager policy the insured cannot recover the premium after the risk is run, though it would appear that he may do so before it is run; and though there be nothing illegal in the contract, and the insured effect the insurance in the conviction that he had a good insurable interest; yet, if the risk be run, and the ship arrive safe, he cannot come upon the underwriters for a return of premium, on the ground that he had no legal title to her. But if a loss happen, in the case of a *bona fide* insurance, and the underwriters resist the claim of the insured on the ground of want of interest, they will not be allowed to retain the premium. The premium is earned, and cannot be redemanded if the circumstances are such that at any time, had a loss happened, the underwriter would have been liable to the full amount insured for. Where the transaction is illegal, and the underwriter in consequence resists payment of a loss, the law does not require the premium to be returned. In the case of material fraud on the part of the insurer, the contract is void, and the premium must be repaid. There is no return of premium where the contract is vacated through the fraud of the insured or his agent, though this doctrine was formerly much modified. Where the voyage is divisible into several distinct risks, and some of these have not been run, a corresponding portion of the premium is returnable. There can be no return of part of a premium where the risk is for a term which has begun to run. A premium, or part of it, may be returnable by stipulation on the policy.

Loss and Adjustment. — The loss in marine insurance is either total or partial The former does not infer the total extinction of the matter insured, but if it be properly abandoned to the underwriters, on account of the extent of the loss, that loss is considered total. (See ABANDONMENT.) Where the policy is valued, the amount of a total loss is fixed and settled, subject to modification if fraud be proved. (See POLICY.) Where the policy is not valued, the amount remains to be adjusted If the policy be an open one, it is an invariable rule to estimate a total loss, not by any supposed price which the goods might have been deemed worth at the time of the loss, or for which they might have been sold had they reached the market for which they were destined, but according to the *prime cost*, that is, the invoice price, and all duties and expenses incurred till they are put on board, together with the premium of insurance. This is the only true, at least the

only legal mode of estimating a loss, whether total or partial, on goods; and whether the goods shall have arrived at a good or a bad market is always immaterial Neither is the difference of exchange to be at all regarded in the adjustment; for the underwriter does not insure against any loss arising from such causes.

The ship is valued at the sum she is worth at the time of sailing, including expense of repairs, value of apparel, provisions, and stores, money advanced to the sailors, and all other expenses of outfit, together with the premium of insurance. A loss at first total may merge into a partial one; as where the ship is captured and recaptured. In the case of a partial loss on cargo, in an open policy, the amount of indemnity to be paid by the underwriters is calculated on the same principle as that above laid down for a total loss, viz., the cost of the goods, — not the price they may bring. To ascertain this, the sum they would bring if they arrived uninjured at their destination is adopted, and the price they actually bring is deducted. The sum they have cost being then stated, a sum bearing to that the proportion which the actual proceeds bear to what would have been the proceeds were the goods undamaged, is found, and deducted from the cost-price; the difference is the sum to be paid. Thus, suppose the goods purchased at $500; that, if they had arrived undamaged, they would have brought $750, but, being damaged, have only brought $250, then as 750 : 250 : : 500 : $166.66. That sum deducted from $500, viz., $333.34, is the sum to be paid by the underwriters. Suppose the same goods brought to a falling market, where if undamaged they would bring not more than $375, and that being damaged they bring but $125, the same result would follow. It thus happens that when the market is a good one the merchant will lose by his insurance; if a bad one he will gain. The underwriter is not responsible for loss arising from the duties or charges to be paid on the goods at their arrival; and so the price which forms the datum for calculating the loss is the gross, and not the net price.

Marine Interest, interest at any rate agreed upon, and which may lawfully be charged for money loaned on respondentia and bottomry bonds, the rates being usually much above the ordinary legal rates, and the usury laws not affecting this kind of contract. — *T. McElrath.*

Marine League, a measure equal to the 20th part of a degree.

Mariner, a seaman.

Mariner's Compass. See COMPASS (THE MARINER'S).

Marine Soap, soap suited for washing in sea-water, which is made chiefly with cocoa-nut oil.

Marine-Store, a place where old ships' materials are bought and sold, as canvas, junk, iron, etc.

Marionettes [Fr.], dancing-dolls; a puppet-show.

Maritime, naval; relating to the sea or to the affairs of the sea.

Maritime Law. By maritime law is meant the law relating to harbors, ships, and seamen. It forms an important branch of the commercial law of all maritime nations. It is divided into a variety of different departments; such as those with respect to harbors, the property of ships, the duties and rights of masters and seamen, contracts of affreightment, average, salvage, etc. The reader will find those subjects treated of under their respective heads. See MASTER, NAVIGATION, SEAMEN, SHIPPING, etc.

Maritime Loan, an agreement to lend money at a stipulated rate of interest, and to take the security on the vessel for the loan. See BOTTOMRY, and MARINE INTEREST.

Marjoram, a pretty, bushy, perennial plant, the *Origanum majorana* (Fig. 342). The fragrant leaves and buds, dried and pulverized, are used as a seasoning in cookery.

Mark, a stamp; a badge; a trade-mark (see TRADE-MARK); a letter, number, or device, put upon boxes or packages shipped; a German coin. See GERMANY (MONEY OF), p. 442.

Market, a public place or building in a city or town, where provisions and merchandise are sold. — Also the disposal of money or commodities; the demand for any particular article, as, the cotton-*M.* in New Orleans is dull.

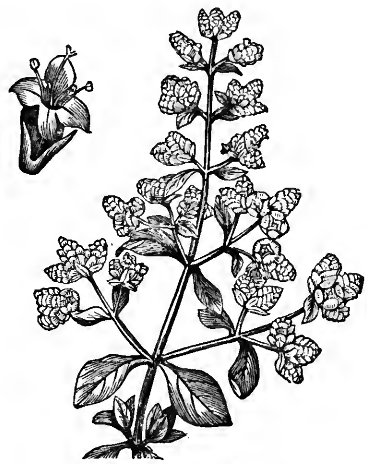

Fig. 342. — MARJORAM.

Marketable, salable; suitable to be offered for sale.

Marketable Value, the price which an article will readily bring when offered for sale.

Market-Gardener, one who raises vegetables and fruit for sale.

Marking-Ink. See INK (INDELIBLE).

Marking-Nut, a name for the seed of the *Semicarpus anacardium.*

Marl, a mixture of limestone and clay, produced by the decomposition of shells in bogs and standing water. It is of a yellow or reddish-gray color, and falls to pieces on exposure to the air. It exists in almost every country, and is much used as a manure. In some marls the proportion of clay is small, in which case it acts on soils much in the same manner as chalk; but where clay is the predominant ingredient, it acts principally by altering the texture of the soil. Hence sandy soils are improved by *M.*, in consequence of its increasing their compactness and capacity for retaining moisture; while argillaceous marls applied to clays are of little or no use.

Marli [Fr.], Scotch gauze.

Marline, a fine kind of spun-yarn. — A small two-stranded stuff used for twisting or winding round rope to prevent injury from chafing.

Marline-Spike, a pointed iron pin, suspended to a lanyard, used by sailors and others to make an opening in rope, etc.

Marling-Hitch, a kind of hitch used by sailors in winding or twisting spun-yarn.

Marmalade properly consists of bitter oranges, the rind and the pulp being separately boiled, and again boiled with sugar. Various kinds of preserved fruits are made nearly in the same way. *Imp.* duty, 35 per cent.

Marmala-Water, a fragrant liquid distilled in Ceylon from the flowers of the Bengal quince (*Ægle marmelos*), and much used as a perfume for sprinkling by the natives.

Marmoratum, a cement of pounded marble and lime for architectural purposes.

Marmottes Oil, a fine oil obtained from the kernel of *Prunus brigantiaca,* which is used instead of olive or almond oil.

Marone, a brownish crimson or claret-color.

Marque (Letters of), letters of reprisal granted by a sovereign, or head of a state, for the purpose of making reprisals on the shipping or commerce of another state, under pretence of indemnification for presumed injuries received. By the law of nations they are grantable whenever subjects of one state are oppressed and injured by those of another, and justice is denied by that state to which the oppressor belongs.

Marquesas Islands, or **Mendaña Archipelago**, a cluster of small islands in the South Pacific Ocean, between lat. 7° 45′ and 11° S., lon. 138° and 141° W.; aggregate area, 480 sq. m. These islands belong to France. They are of volcanic origin, and are in general covered with mountains, rising in some cases to about 3,500 feet above sea-level; the soil is rich and fertile, and the climate hot, but healthy. The coasts are difficult of access, on account of the surrounding reefs and the sudden changes of the wind. Cocoa-nut, breadfruit, and papaw-trees are indigenous, and bananas, plantains, and sugar-cane are cultivated. Nukahiva is the largest island. Pop. of the group, about 10,000.

Marquee, a large field-tent.

Marquetry, a kind of inlaid cabinet-work, which presents a sort of medium between Mosaic and buhl-work, in so far as it relates to the production of patterns by inlaying woods of different colors or different direction of grain. The woods may be of their natural color, or dyed to any required tints or shades of the same color. Birds, flowers, scrolls, and devices of almost every kind may be thus made; even portraits, though with an effect certainly not adequate to the amount of labor bestowed. The cutting out and the insertion of the inlay in the foundation are effected nearly in the same way as in buhl-work. This kind of decorative cabinet-work is not so much in favor as it was a century ago; but a useful kind of wood inlay is now in vogue, described under PARQUETRY.

Marquette, a cake of beeswax.

Marquette, Houghton, and Ontonagon R.R. runs from Marquette to L'Anse, Mich., 63.10 m.; branches, 25.42 m.; total, 88.52 m. This Co., located in Marquette, is a consolidation (Aug. 22, 1872) of the Marquette and Ontonagon and the Houghton and Ontonagon R.R. Cos. Cap. stock: common, $2,306,600; preferred, $2,259,026; total, $4,565,626. Funded debt, $4,242,200, consisting of 1st mortgage Marquette and Ontonagon R.R., interest 8%, payable in 1892, $1,760,000; and 1st mortgage of the consolidation Co., interest 6%, payable in 1908, $2,482,200. — Cost of road and equipment, $8,855,337.

Marsala, a seaport. See SICILY.

Marsala Wine. See ITALIAN WINES.

Marseilles, a seaport. See FRANCE.

Marseilles, a general term for certain kinds of fabrics now made in England as well as France, which are formed of two series of threads interlacing each other, and then forming double cloth, quilted in the loom, usually woven in diamond form, or in stripes or ribs, also woven in jacquard figures in two or more colors, for vestings.

Marseilles Soap. Marseilles is the chief seat of the soap manufacture in France, and olive-oil is principally used in this manufacture. The mottled soap of Marseilles is also called *Castile soap*.

Marsella, a kind of twilled linen.

Marsh-Gas. See FIRE-DAMP.

Marsh-Mallow. The leaves of the *Althæa officinalis*, being demulcent and pectoral, are used by herbalists, and, like those of the common mallow (*Malva sylvestris*), made into poultices for use in external inflammation.

Mart, a market; a place of public sale or traffic; an emporium.

Marten. See FUR.

Martingale, a perpendicular spar under the bowsprit end, for guying down the head-stays of a ship. — Part of a horse's bridle, a strap from the noseband to the girth, to prevent him tossing up his head and rearing.

Martini-Henry Rifle. See GUN.

Martinique, one of the Windward group of the West India Islands, belonging to France. It lies between lat. 14° 23′ and 14° 53′ N., lon. 60° 50′ and 61° 19′ W., 20 m. S. E. of Dominica and 20 m. N. of St. Lucia; length, 45 m.; greatest breadth, 15 m.; area, 381 sq. m. The surface is much diversified with mountains and valleys, the latter of which are exceedingly fertile, and produce sugar, coffee, cocoa, and cotton, besides the usual tropical fruits. The island is evidently of volcanic origin, there being six extinct craters, while the interior is traversed by immense masses of igneous rock, which, in some places, are covered with primeval forests, and in others rise to great elevations. The streams are numerous but small, and are only navigable for boats within a few miles of their mouths. There are several excellent harbors, the best of which is Port Royal, on the S. W. side. The chief town is St. Pierre, on the N. W. coast. Pop. 153,334.

Maryland, one of the Eastern States of the American Union, is bounded N. by Pennsylvania, W. and S. W. by Virginia and West Virginia, E. by Delaware, and S. E. by the Atlantic Ocean. It lies between lat. 37° 53′ and 39° 44′ N., lon. 75° 4′ and 79° 33′ W.; extreme length from E. to W., 190 m.; greatest breath, about 120 m. Area (excluding Chesapeake Bay), 11,124 sq. m. It is divided into 23 counties. *Annapolis* (pop. 6,500) is the capital, but *Baltimore*, a magnificent city and important seaport (see BALTIMORE), is the chief commercial and manufacturing mart. *M.* has 3 other cities: *Cumberland* (pop. 9,000), the depot of the mining region in the W. of the State; Frederick (pop. 9,500); and Hagerstown (pop. 6,000). Total pop. of the State, about 925,000.

The division of *M.* known as the *tide-water section* is separated by Chesapeake Bay into two parts, viz., — that known as the *Eastern Shore*, comprising portions of Harford and Baltimore counties, and the 5 most S. counties W. of the bay, with the exception of the narrow strip between Baltimore and Havre de Grace. The other division of this section, called the *Western Shore*, is in the general form of a triangle, whose base is the Baltimore and Washington Railroad, and its apex Point Lookout, the distance between those lines being about 70 m. in a direct line; while the two sides of the triangle are formed by the Patapsco River and Chesapeake Bay on the E., and the Potomac River on the W. The latter river is navigable along its entire border, in this section, for vessels of the largest class, varying in breadth from about 7½ m., at its embouchure, to about 1 m. at Washington, the head of the tidal stream. Numerous creeks, inlets, and small bays, branching both from this estuary and from the still larger expanse of the Chesapeake, afford safe harbors and convenient landing-places. The Patuxent River, also emptying into Chesapeake Bay, traverses this section of the State, running parallel to the Potomac, with safe navigation for steamers and small craft for about 40 m. from its mouth. The seacoast of *M.* is only 33 m. in length; but, including the whole tide-water region of the Chesapeake Bay, the shore-line is estimated at 411 m. The Atlantic coast has no harbors, and

Fig. 343. — SEAL OF MARYLAND.

is bordered throughout by a sandy beach from a few yards to more than a quarter of a mile in breadth, enclosing a shallow lagoon. — The second grand section of this State is the *Blue Ridge division*, including all that part of *M.* between the tide-water division on the E. and the Mountain or Alleghany division on the W., extending entirely through the State from the Pennsylvania line on the N. to the Potomac, separating it from Virginia on the S. Commencing at the head of tide-water of the streams emptying into Chesapeake Bay, it expands into a broad belt of country to the foot of the Alleghanies, becoming known thereby as a slope of the Alleghany range. This tract is formed principally of parallel plateaux of gently progressive elevation, with fertile valleys nestling between. Through these valleys, at nearly right angles, a riparian system, finding its many outlets in the Chesapeake, effectually drains the basin of the country, besides affording abundant water-power for manufacturing purposes. The hilly spurs, generally parallel with the the ocean, culminate first in a well-defined crest known as Parr's Ridge, in the W. part of Montgomery, Howard, and Carroll counties, whence a gradual slope extends to the Monocacy River, and meeting the Monocacy Valley, proceeds W. to the foot of Cacoctin Mountain, between which and the South Mountain lie the beautiful dales known as the Middletown and Harbaugh's valleys. Between the Blue Ridge and the foot of the Alleghanies, in the W. part of Washington Co., is the famous Hagerstown Valley. This section embraces the same varieties of soil, improved to an equal extent, as the best of the famous wheat-lands of Pennsylvania and N. Y. State, with all the advantages of a milder climate. It is a region, indisputably, of the highest salubrity, with the best class of soils for the production of all the staple cereals and vegetables, abounding in almost unlimited water-power, with numerous quarries of granite, marble, roofing-slate, soapstone, and other building-materials of capital quality, with large deposits of iron-ore, besides some good mines of copper and asbestos, and with chrome deposits, whose extent may supply all that is needed of the article in commerce. — The third, and last, territorial section, called the *Mountain* or *Alleghany Division* (consisting of Alleghany Co.), embraces by far the largest area of any of the counties, forming the long and narrow segment of country impinged upon by W. Virginia on the S., and bounded on the N. by the Pennsylvanian border; presenting a maximum length of about 43 m., with, in its widest part, a breadth of about 30 m. The Potomac River, here barely navigable at high water for flat-bottomed boats, forms its entire S. limit of demarcation. The surface of this division is much broken by spurs of the Alleghany chain which surround it. One of the most striking and curious features of this district is the *glades*, — large, level, swampy bodies of land interspersed between the higher ridges of the mountains. This tract is sometimes for miles found as level as any of the marshes bordering the seaboard, and is covered with a luxuriant vegetation of wild grass, without timber or dendritic growths of any kind. They accordingly form fine pasturage for large flocks of cattle, which are brought hither from Virginia, during the summer months, for feeding. The soil descends to the depth of many feet, contains a large proportion of vegetable matter, and, from this cause, is dark, thin, and chaffy, resembling very much the Black Gum Swamp soils of the lower counties of the E. Shore. The Little Savage Mountain, an offset of the Alleghanies, divides the E. waters —which flow into the Potomac — from the W. waters, that find their outlet in the Ohio. The summits of the mountains range from 1,500 to 2,700 feet above high-water mark; and though the climatic temperature in summer is pleasant, the seasons are backward and the winters of long duration and great severity. The crops most generally grown are oats and buckweat, rye, wheat, and Indian corn. The alluvial bottoms yield, principally, corn; buckwheat and rye are confined more especially to the higher elevations of the country, while wheat is almost exclusively restricted to the clay-limestone lands in the E. part. — The mineralogical aspect of *M.* carries with it a certain degree of importance. In the Alleghany Division, especially, its resources of coal, iron ore, and fire-brick clay are very great. What is called the Eastern coal-field embraces an area of coal-formation of 120 sq. m. The average thickness of workable coal suited to commercial purposes is, by approximation, about 11 ft., and the mineral from this coal-field alone is sufficient to supply the whole Union for centuries, and, practically, may be said to be inexhaustible. The middle Alleghany coal-field produces a fine compact article, approaching nearest in its composition to the Pittsburgh coal. See COAL, *Cumberland Region*, p. 177.

M. is essentially an agricultural State, having on the whole an exceedingly fertile soil, though patches of poor land occur here and there towards the coast. Large quantities of excellent wheat, of a variety supposed to be peculiar to this State, are raised, especially on the E. Shore; the crop, however, is somewhat precarious, and Indian corn is the main reliable product. Tobacco is another great staple, and is grown almost exclusively within a belt of country on the W. Shore. *M.* ranks as the third tobacco-growing State in the Union, as far as absolute quantity is concerned, while, *pro rata* to its population, it stands second. The chief varieties of the cereals and pulse of the more N., and some common to the more S. States, are produced. Sorghum flourishes in great perfection. The cultivated grasses are clover, timothy, rye-grass, herds-grass, — all growing luxuriantly; and there are, besides, many indigenous grasses which afford an almost constant good pasturage for cattle and other stock. Cotton is raised chiefly for domestic purposes, and hemp and flax are cultivated in the W. part of the State. Hemp, dairy-produce, hops, wine, beeswax, maple-sugar, and molasses also form considerable items of field and farm production. The cultivation of the silk-worm obtains, but is, comparatively, as yet undeveloped. Fruits and vegetables of the choicest qualities yield a prolific harvest; of the pomological class, melons, cantaloupes, peaches, apples, pears, apricots, nectarines, various kinds of berries, grapes, plums, figs, and pomegranates, afford an abundant supply from the earliest part of the season to the latest. Many of the forest-trees, especially the oak, hickory, and beech, by their abundant mast, furnish copious food for hogs. The forests and fields, too, abound with many excellent wild fruits, of the nut and berry varieties. The relative value of agricultural products for the year 1879 is given in this work under the names of each of the principal crops.

For Commerce, Manufactures, and Shipping, see BALTIMORE.

The canals and railroads of *M.* are on a scale commensurate with its wealth and commercial importance. The Chesapeake and Ohio Canal, constructed to unite Georgetown, D. C., with Pittsburgh, on the headwaters of the Ohio, was completed in 1845. It is, for the greater part, from 60 to 70 ft. in width, though in places it is contracted to 50 and expanded to 150 ft.; its depth is 6 ft. The rise to Williamsport, 105 m. from Georgetown, is 353 ft., which is overcome by 44 locks, 100 ft. long by 15 wide. There are in this distance 119 culverts and 6 aqueducts, one of which is 1,714 ft. in length; culverts, aqueducts, and locks are all built of solid stone masonry. In 1870 there were in this State 493 m. of railroad open, irrespective of sectional lines; of these railways, the Baltimore and Ohio is one of the most stupendous works of the kind ever undertaken on the American continent. In 1879 *M.* had 951 m. of railroad in operation. The following table exhibits the names of the railroad companies, the total length of roads, and the total length in the State: —

Names of Companies.	Total length of line.	Total length of line in Maryland
	Miles.	Miles.
Annapolis and Elkridge	20.50	20.50
Bachman Valley	13.00	4.00
Baltimore and Hanover	5.50	5.50
Baltimore and Ohio	435.00	193.60
B. & O., — Washington Branch	31.00	31.00
Baltimore and Potomac	90.20	90.20
Columbia and Port Deposit	39.40	12.80
Cumberland and Pennsylvania	55.00	55.00
Cumberland Valley	82.20	13 90
Delaware	100.50	4.00
Delaware and Chesapeake	53.75	39 25
Dorchester and Delaware	28.00	28 00
Eastern Shore	38.00	38.00
Emmittsburg	7.00	7.00
Frederick and Pennsylvania Line	28.00	28.00
Kent County	30.00	30.00
Northern Central	150.71	48.56
Philadelphia and Baltimore Central	46.00	9 25
Philadelphia, Wilmington, and Baltimore	111.95	56.37
Pittsburgh and Connellsville	151.50	5 80
Queen Anne and Kent	26.00	26.00
Salisbury and Baltimore	4.60	4 60
Union (Canton Co.)	4 50	4.50
Washington County	24.25	24.25
Washington City and Point Lookout	12.50	12.50
Western Maryland	90.00	90.00
Wicomico and Pocomoke	23.00	23.00
Worcester	36.00	36.00
Worcester and Somerset	10.00	10.00

Besides Baltimore, *M.* includes the customs district of Annapolis, the eastern district, and part of the district of Cherrystone, Crisfield being the port of entry of the two last. — In 1879 *M.* had 32 national banks in operation, whose paid-in capital was $12,865,010. There were, besides, 54 State banks, saving-banks, and private banks, whose aggregate capital was $4,789,029. The State debt amounted to $10,722,912; of which $4,601,712 was stock issued to corporations paying their own interest, leaving the balance of non-productive debt at $5,171,200. For this balance the State had as an offset non-paying stocks amounting to $23,763,430, and accounts due, $1,430,000. The taxable property, $464,425,790; tax per capita, $0.95.

Mas, a money of account, by which calculations are made in Cochin China, equal to about 3*d*. In Indian numeration, the mas is 100 crores of rupees,

the crore being $5,000,000. Mas is also the Malay name for gold; mas-urei being gold-dust.

Mash-Tun, one of the most important vessels in the brew-house, made of cast-iron, in a circular shape, and provided with an inner pierced bottom.

Mask, a cover for the face in fencing, etc.—Also covers to disguise the face; those most in use are imported from France and Germany, and consist of a false face made of pasteboard, with the eyes, nose, mouth, hair, etc., painted.

Mason, a worker or builder in stone or brick; a stone-cutter.

Masonry, in the general acceptation of the term, is the art of cutting or squaring stones, to be applied to the purposes of building; or, in a more limited sense, it is the art of joining stones together with mortar, or otherwise, so as to produce a regular construction.

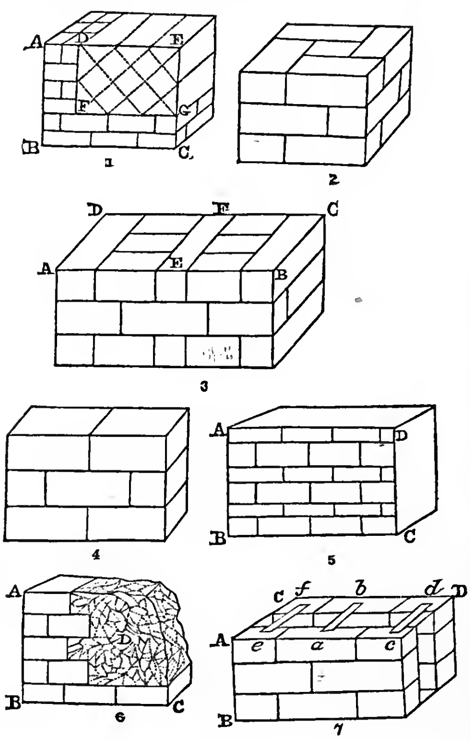

Fig. 344.

The ancients enumerate seven different methods (Fig. 344), in which they arranged the stones of their buildings. Vitruvius thus classes them: three of hewn or squared stones, three of unhewn, and one a mixture of both methods.—1. *Net M.* is represented within the area D E F G, where the stones are squared and placed upon one of the angles, their joints thus forming a net-like appearance. This method, though very neat, is wanting in firmness and strength; for the oblique position of the stones, in regard to each other, gives them a tendency to separate rather than to form a compact assemblage of parts that unite in supporting each other. Whenever this form of *M.* is employed, it is consequently necessary to keep the work together by a border of stones, having some other arrangement, one that is not only capable of supporting itself, but of overcoming the resistance of the net-like form. This is shown in the same figure at A B C; and where the network is merely a casing of stone to the brick-work of a wall, it will be found to answer tolerably well, and looks very neat.—2. *Bound M.* is remarkably strong. The perpendicular joints in each course fall directly in the middle of the stones composing the course below and above it; and while it has every requisite of solidity, the joints have, at the same time, a regular and pleasing appearance.—3. *Greek M.* is that in which every alternate stone, as shown at A D, E F, and B C, is made of the whole thickness of the wall, and serves to bind together the stones which compose the external and internal faces of the building; and this may be called double binding, as from the perpendicular joints being somewhat similarly situated to that in bound masonry, it has also an additional binding, by extending to the courses above and below it, thus forming a compact and durable wall, which resists every effort to separate in any direction.—4. *M. by equal courses.* This method of uniting stones only differs from the bound *M.* in its being composed of unhewn stones, or rather in being formed of stones that are not so accurately cut, nor the edges so perfectly squared; it being only necessary that the external face should be level, and the horizontal joints at equal distances from each other, care being taken at the same time that the perpendiculars are so situated as to bind the courses above and below them.—5. *M. by unequal courses.* This is, like the last, formed of unhewn stones, without any regularity as to their size, it being sufficient that each course is made to bind with the preceding, and the only regularity observed is in the joining which separates each course, the courses themselves being of unequal thickness, as shown at A B C D.—6. *M. filled up in the middle* is formed of unhewn stones of unequal courses, and the middle, as at D, is filled up with stones thrown in at random among the mortar.—7. *Compound M.* is, as its name imports, a mixture of the other kinds. In the accompanying diagram, the external course, A B, is formed of bound *M.*, and the corresponding internal course is at some distance from it, but held to the former by means of iron cramps, as shown at *a, b, c, d, e, f*, the space between being filled in with small stones or flints thrown into the mortar.

At the present day some of the older modes have fallen into disuse. Those most frequently employed are: *Rubble-work*, in which irregular stones are cemented into their places without being squared; *coursed-work*, in which the stones are made somewhat more square and regular; and *ashlar-work*, in which the squaring is rendered still more complete. Rubble is sometimes improved by introducing squared stones at the angles and the more prominent parts, with *heading* or *band stones* carried through the whole thickness of the wall. A rubble wall may either have cement or plaster, or may consist of stones large enough to hold together by their mutual weight and pressure. An ashlar wall may have its regular squared stones only on the surface, the hinder and hidden portion being of brick. In the best ashlar *band* stones are placed here and there, running through the brick-work as well: in commoner kinds timber band is used.—*The Tools.* In the various processes of preparing, placing, and fixing the stone, tools are used of several kinds, but not of complicated character. The *saw* (with a straight, and not toothed edge) severs the stone into pieces. The *wedge* does the same thing in a rougher way, and for small pieces. The *chisel*, a small strong iron tool with a steel edge, presents much variety of shape. The *mallet* is a sort of large hammer with a short handle. The *point* is an iron tool which works the stone in narrow ridges and furrows. The *inch tool*, rather more like a chisel, works down the ridges. The *boaster*, still broader, smooths the work further. The *broad tool* is another of the same class. A *stone axe* aids in giving shape to an irregular piece. A *jedding axe*, like a hammer with one flat face and one pointed, furthers the process; and so does the *cavil*. The *level* aids in preserving horizontality; the *plumb-line* gives the vertical; the *square* insures right angles; while the *bevel* regulates the angle of sloping surfaces.—*The Working.* Sometimes a *cramp*, or *dowel*, is used to assist in retaining the stones in their places, an irregular or *dove-tailed* piece of metal or wood crossing a joint from one stone to another, and secured to both. A *joggle* is a projection in the end of one stone, fitting into a cavity in the end of the next adjoining, something like the tenon and mortise of the carpenter. The *joggle dowel* is a third and separate piece of stone for this purpose. Various technical names are given to the modes of dressing the surfaces of masonry; such as *pointing*, or working with the point; *boasting*, or working with the boaster; *stroking*, or making parallel lines and ridges over the whole surface; *tooling*, a modification of stroking; *droving*, nearly like boasting; *broaching*, or chiselling with a kind of punch; *picking*, or the use of a cavil for very hard stone; *rubbing*, or smoothing with sand and water. In curved work, whether convex or concave, the curves are maintained by the use of *gauges, templates*, etc.—*Sculpture*, or *statuary* work, in which the stone is not only shaped, but carved, is more an artistic than a mechanical employment, so much depending on the taste with which the workman realizes the design of the architect.

Massachusetts, one of the eastern U. States, and one of the New England States, lies between lat. 41° 23′ and 42° 52′ N., lon. 69° 30′ and 73° 30′ W. It is about 190 m. long, with an average breadth of 90 m.; area 7,800 sq. m. It is bounded N. by Vermont, New Hampshire, and the Atlantic Ocean; E. by the Atlantic Ocean; S. by Connecticut, Rhode Island, and the Atlantic Ocean;

W. by New York. In proportion to extent and pop., *M.* has more large cities than any State in the Union. *Boston*, the capital, is the largest city, and the commercial centre of the State (see BOSTON). The other cities are: Cambridge, pop. 45,000; Chelsea, 20,000; Fall River, 30,000; Fitchburg, 13,000; Gloucester, 17,500; Haverhill, 14,000; Lowell, 45,000; Lynn, 32,000; New Bedford, 23,000; Newburyport, 13,500; Newton, 14,000; Salem, 27,000; Somerville, 16,000; Springfield, 29,000; Taunton, 20,000; and Worcester, 45,000. Total pop. of the State, about 1,750,000.

This State presents three distinct zones. The first, toward the ocean, is a marine alluvion but little elevated above the sea; it is mostly sandy, and the least fertile and smallest in extent of the three sections. This plain is followed by a fine hilly tract which crosses the State from N. to S., elevated in some places 300 feet above the sea; from these elevations the rivers flow in every direction The second, or middle zone, includes part of the beautiful valley of the Connecticut, and is followed by the mountainous but highly fertile county of Berkshire, which comprises the whole W. part of the State. Through Berkshire pass two mountain ranges, the Taghkanic, on the W. border of the State, and between the Housatonic and Connecticut Rivers the Green Mountain range, here called the Hoosick Mountains. Mount Holyoke, Northampton, is about 1,200 feet above the level of the sea, and Wachusett Mountain, in Princeton, is an elevated peak from 2,000 to 3,000 feet high. Saddle Mountain, in the Taghkanic range, in the N. W. corner of the State, is 4,000 feet high, and Mount Washington, in the same range, in the S.W. corner of the State, is about 3,000 feet high. The valleys of the Connecticut are fertile, as are also those of the Housatonic. The principal rivers are the Connecticut, a noble stream winding for 50 m. across the State; the Housatonic, which rises in Berkshire Co., and flows through the W. part of the State; and the Merrimac, which rises in New Hampshire, and has a course of 50 m. in the N. E. part of the State, and enters the ocean below Newburyport. It is navigable for large vessels to Haverhill, 15 m. Besides these there are the Nashua, Concord, Taunton, and Blackstone Rivers. *M.* has numerous good harbors. There are several important islands off the S. shore of this State, to which they belong. The largest is Nantucket, 15 m. long and 11 m. broad, and which constitutes a county of its own name. Martha's Vineyard, W. of Nantucket, is 20 m. long and from 2 to 10 m. broad, which, with other small islands, constitutes Duke's Co. The shores of *M.* are diversified by some bold promontories and capacious bays. Of the latter, Massachusetts Bay, between Cape Ann on the N. and Cape Cod on the S., is about 40 m. in breadth. Buzzard's Bay is on the S.W. side of Cape Cod, and is 20 m. long. Cape Ann, in the N. part of the State, is a rocky promontory 15 m. in length. Cape Cod is a peninsula in the S. E. of the State, extending 75 m. long and from 2 to 20 m. broad, with a bend in the middle nearly at right angles. The peninsula of Nahant, a few miles N. of the harbor of Boston, is connected with the main-land by Lynn Beach, 2 m. long. It has long been, on account of its cool breezes and wild sea-views, a place of fashionable resort during the summer months. The climate of *M.* varies according to elevation; but is generally dry and healthy, except on the coast, where the winters are very severe, and the springs subject to chilling N. E. winds, very unfavorable to delicate lungs. The thermometer, it is said, in the plains, during summer, often exceeds 77°, and sometimes rises to 100° F. The rocks of *M.* are mostly primary, covered in some places with the older secondary formation. In many localities in Bristol and Plymouth Cos. beds of anthracite exist, some of which, as at Mansfield, have been worked many years. They prove, however, of little or no value, the coal always being very friable, and the beds most irregular in their production. Gneiss and talcose, and mica slate in broad belts, traverse the State from N. to S., from the E. portion to the waters of the Housatonic in Berkshire. Among these rocks are interspersed a few beds of metamorphic limestone, but no minerals or ores of value. Along the Connecticut River the middle secondary red sandstone is met with in one or several belts, in the northern termination of this group of rocks, which is thence traced S. as far as Virginia. Trap-rocks are associated with it, and near the contact of the sandstone and trap, or of the sandstone and gneiss, are found veins of metallic ores, as of copper, lead, and zinc, none of which, however, have repaid the money spent in their exploration. The principal localities of these ores are at Southampton, Leverett, Montague, Whately, etc. Along the Housatonic, and on the high lands which traverse the State from N. to S., are the regions of the altered Silurian sandstones and calcareous formations This is the most important mineral region in the State, numerous beds of iron ore having been worked to advantage, and the quartz rocks affording in their disintegrated beds bodies of glass-sand of unusual purity. In no part of the Union have greater advances been made in agriculture, against greater disadvantages, and by sheer cultivation. Almost every acre of arable land has been improved, so that every variety of grain, fruit, and vegetables common to the temperate region thrives well, and yields an abundant return. The relative values of agricultural products for the year 1879 are given in this work under the names of each of the principal crops. The number of farms in *M.* under cultivation, as reported by the last census, was 26,500, and the extent of improved land on farms was 1,736,221; woodland, 706,714; other unimproved, 287,348. The value of farms was $116,-432,784; of farming implements and machinery, $5,000,879; total value of all farm productions, $32,192,378; of orchard products, $939,854; of produce of market-gardens, $1,980,321; of forest products, $1,916,818; of animals slaughtered, $4,324,-658; of all live-stock on farms, $17,049,228.

Fig. 345.
SEAL OF MASSACHUSETTS.

In manufacturing enterprise *M.* compares favorably with any portion of the world; and in proportion to extent and population, the industries of this state are more extensive than those of New York and Pennsylvania. *M.* is particularly noted for the extent of its manufactures of boots and shoes, and cotton and woollen goods. The other leading industries are bleaching and dyeing, cordage and twine, cutlery, chairs, lasts, paper, sails, and straw goods. The cod and mackerel fishery, which at one time formed one of the most important branches of industry on the coast of *M.*, has greatly decreased. The principal centres of this industry are Gloucester and New Bedford, which last port is the leading market in the U. States for the produce of the whale. According to the last census, the capital invested in manufactures was $231,677,862, and the value of annual products, $553.912,568; there were 13,212 establishments, using 2,396 steam-engines of 78,512 horse-power, and 3,157 water-wheels of 105,854 horse-power, and employing 279,380 hands, of whom 179,032 were males above 16, 86,229 females above 15, and 14,119 youths. The imports and exports for the year 1879 were as follows:—

Ports of Entry.	Imports.	Domestic Exports.	Foreign Exports.
Barnstable	$13,780	$18,782	
Boston	40,516,981	48,100,019	$1,093,645
Fall River	7,003	2,967	
Gloucester	58,253	88,574	149
Marblehead	5,848	551	
New Bedford	74,608	475,989	1,327
Newburyport	6,625	5,729	
Plymouth		3,540	
Salem and Beverly	9,216	7,719	
	$40,692,314	$48,703,870	$1,095,121

The number of vessels registered, enrolled, and licensed at the 11 ports of entry of *M.*, and the amount of foreign shipping at these ports for the year 1879, were as follows:—

Ports of Entry.	Registered, etc.		Entered.		Cleared.	
	No.	Tons.	No.	Tons.	No.	Tons.
Barnstable	362	30,935	21	3,443	33	2,898
Boston	872	280,121	2,390	1,137,633	2,222	1,025,280
Edgartown	32	1,552	3	325	4	331
Fall River	113	28,469	9	1,413	5	615
Gloucester	492	28,534	96	15,899	92	10,208
Marblehead	66	2,468	25	2,350	18	1,688
Nantucket	8	1,262				
New Bedford	278	47,596	75	21,806	69	17,472
Newburyport	64	13,918	16	1,495	17	1,685
Plymouth	58	2,934			2	135
Salem and Beverly	74	6,777	34	3,432	34	3,477
	2,419	444,566	2,669	1,187,796	2,496	1,063,689

The number of vessels engaged in the coastwise trade and fisheries was as follows:—

Ports of Entry.	Entered.		Cleared.	
	No.	Tons.	No.	Tons.
Barnstable	10	809	11	1,659
Boston	926	980,712	1,369	1,143,881
Edgartown	6	961	8	1,286
Fall River	563	987,321	544	984,214
Gloucester	37	3,413	24	5,933
Marblehead	4	641	4	654
Nantucket	4	1,602	1	72
New Bedford	196	133,151	14	4,946
Newburyport	553	89,959	560	91,606
Plymouth	11	787	1	83
Salem and Beverly	25	3,070	15	1,865
	2,335	2,202,426	2,551	2,236,199

In 1879 *M.* had 1,872 m. of railroad completed. The following table exhibits the names of the R.R. companies (omitting, however, those whose lines are under 5 m.), the total length of lines, their total length in *M.*, and the cost of constructing per mile: —

Companies.	Total Length of Line.	Total Length of Line in M.	Cost of Construction per Mile.
	Miles.	Miles.	$
Berkshire	22.00	22.00	27,273
Billerica and Bedford	8.63	8.63	19,832
Boston and Albany	249.63	193.00	115,036
Boston, Barre, and Gardner	36.53	36.53	29,245
Boston, Clinton, Fitchburg, and New Bedford	125.33	125.33	48,033
Boston and Lowell	45.96	45.96	131,422
Boston and Maine	126.50	42.50	91,250
Boston and Providence	63.75	53.33	82,491
Boston, Revere Beach, and Lynn	8.80	8.80	55,888
Cheshire	53.62	10.81	50,681
Connecticut River	55.85	58.85	49,062
Danvers	9.26	9.26	26,401
Eastern	117.99	117.99	66,999
Fall River	12.25	12.25	36,110
Fall River, Warren, and Providence	5.79	3.66	53,669
Fitchburg	93.32	83.95	64,256
Framingham and Lowell	26.12	26.12	54,196
Hanover Branch	8.00	8.00	31,924
Holyoke and Westfield	10.32	10.32	44,793
Hopkinton	11.45	11.45	25,548
Lancaster	8.40	8.40	27,434
Lowell and Andover	10.10	10.10	74,714
Lowell and Lawrence	12.35	12.35	42,609
Martha's Vineyard	8.78	8.78	12,375
Middlesex Central	8.00	8.00	38,854
Monadnock	15.80	2.04	23,150
Nashua, Acton, and Boston	20.21	15.46	52,305
Nashua and Lowell	14.50	9 25	79,295
Newburyport	26.98	26.98	22,126
New Haven and Northampton	99.01	32 62	48,749
New London Northern	100.00	44 00	22,846
New York and New England	139.00	98.75	63,748
New York, New Haven, and Hartford	140.50	5 87	111,979
Norwich and Worcester	66.40	17.40	55,094
Old Colony	301.84	285.62	43,667
Pittsfield and North Adams	18.65	18.65	23,526
Providence and Worcester	51.41	27.01	72,350
Rhode Island and Mass	14.12	6.62	16,000
Salem and Lowell	16.88	16.88	23,633
Springfield, Athol, and North-eastern	48.50	48.50	30,502
Springfield and New London	7 50	7.50	24,974
Stockbridge and Pittsfield	22.00	22.00	26,395
Stony Brook	13.16	13.16	22,667
Troy and Greenfield	44 00	44.00	316,818
Vermont and Massachusetts	80.11	69.80	41,104
Ware River	49.30	49.30	22,620
Worcester and Nashua	45.69	39.06	55,298

In 1879 *M.* had 237 national banks in operation, whose paid-in capital was $95,407,000. There were, besides, 229 State banks, savings-banks, and private bankers, whose aggregate capital was $3,896,063. The State debt amounted to $33,020,464, and the sinking fund to $11,268,595. The total of taxable property was $1,879,823,738, and the tax per capita, $1.37.

The principal ports of *M.*, besides BOSTON (which see), are: —

Fall River, situated in Bedford Co., on Mount Hope Bay, an arm of Narragansett Bay, at the mouth of Taunton River, 45 m. S. by W. of Boston. Its safe and commodious harbor is easy of access, and deep enough for the largest vessels. The chief industry of Fall River is the manufacture of cotton goods, chiefly print cloths, this city containing more spindles than any other in the U. States. Daily lines of steamers run to Providence, Newport, and New York. Pop. 30,000.

Gloucester is situated on the peninsula of Cape Ann, 30 m. N.N.E. of Boston, with which it is connected by railroad. The city consists of 6 villages: East Gloucester, Annisquam, Bay View, Lanesville, West Gloucester, and Gloucester Village, or "The Harbor," which has one of the best ports on the coast, capacious, safe, easy of access, and with sufficient depth of water to admit the largest vessels. The harbor is formed by a peninsula, known as Eastern Point, jutting out from the main body of Cape Ann in a S. W. direction, and opens into Massachusetts Bay. *G.* is chiefly noted for its cod and mackerel fisheries, far surpassing any other port in the country in the number of vessels and men employed, and in the value of the catch. Pop. 17,500.

New Bedford, one of the capitals of Bristol Co., is situated in lat. 41° 38′ N., lon. 70° 55′ W., 50 m. S. by E. of Boston, on the W. side of Acushnet River, whose mouth here forms a commodious harbor, and is crossed by a bridge 4,000 ft. long. It has long been the seat of the American whale-fishery, and of 185 vessels, of 40,028 tons, engaged in it in the U. States in 1879, 144, of 35,208 tons, belonged to New Bedford. Pop. 23,000.

Newburyport, in Essex Co., is situated in lat. 42° 48′ 30″ N., lon. 70° 52′ 3″ W., 34 m. N.N.E. of Boston, on the S. bank of the Merrimac River, 3 m. from its mouth. The port is safe and commodious. The bar at the month of the river is shifting, with 9 ft. of water at low, and 17 at high water. Newburyport has important manufactories of print cloths and fine sheetings and shirtings, boots and shoes, combs, hats, steam-pumps, paper, iron and brass castings, machinery, jewelry, etc. Pop. 13,500.

Salem, in Essex Co., on a peninsula between two arms of the sea, called North and South Rivers, 14 m. N. by E. of Boston, with which it is connected by railroad. This port has now almost no foreign commerce, but its coasting trade is large and increasing, and the town is an important manufacturing place. The leading branch of industry is the manufacture of leather. Other articles are jute bagging, cordage, twine, machinery, foundry products, cars, chemicals, boots and shoes, white-lead, leather belting, lead pipe and sheet-lead, trunks and valises, furniture, and glue. The car-shops of the Eastern Railroad Co. are here. The Naumkeag steam cotton company has two large mills, with 1,438 looms and 73,594 spindles, and employs a capital of $1,200,000. There are seven national banks, with an aggregate capital of $2,015,000; two savings-banks, with about $8,000,000 deposits; and five insurance companies. Pop. 27,000.

Massachusetts Mutual Life Insurance Co., located in Springfield, Mass., organized in 1851. *Statement,* Jan. 1, 1880: Assets, $6,625,629; liabilities, $5,588,708; gross surplus, $1,036,921; policies in force, 13,065, amounting to $28,777,145; premiums, $774,609; dividends paid to policy-holders, $161,859.

Massicot, a manufacturing name for a tolerably pure oxide of lead, the protoxide used by glass-makers.

Mast, a long piece, or system of pieces, of timber, placed nearly perpendicularly to the keel of a vessel to support the yards or gaffs on which the sails are extended. When the mast is one entire piece, it is called a pole-mast; but in all larger vessels it is composed of several lengths, called lower, top, and top-gallant masts; sometimes a fourth, called a royal mast. The method of supporting each mast on the one next below it is peculiar. On the sides of the lower mast, some feet below the head, are placed checks; on these are fixed horizontally two short pieces of wood, fore and aft, called trestle-trees. Across these, at right angles, are laid, before and abaft the mast, two or more longer and lighter pieces, called cross-trees, which give the name to the entire system. On the mast-head itself is a cap. The topmast being placed up and down, the fore side of the lower mast is swayed up between the trestle-trees, and through the round or foremost hole in the cap. When raised so high that the heel of the topmast is nearly up to the surface of the cross-trees, a piece of iron, called the fid, is put through the hole in the heel for the purpose; and on this fid, of which the ends are supported on the trestle-

trees, the topmast rests. When fidded, the topmast is stayed, and the rigging or shrouds set up to the dead-eyes in the ends of the cross-trees. These dead-eyes pull from the lower rigging below, and thus the cross-trees serve merely to extend the rigging. The top-gallant is supported in the same manner on the topmast. When the mast is to be taken down, it is first raised to relieve the fid; which being drawn out, the mast is lowered. The masts are supported by a strong rope, leading forward, called the stay; by others, leading aft on each side of the ship, called, in general, backstays; and by others abreast, called shrouds, and also breast backstays. Large lower masts are composed of pieces, and are frequently made of several lengths, about a foot or so square, and the whole supported merely by hoops at intervals. The main-mast is near the middle of the vessel, the foremast is that which is nearest the fore part, and the mizzen-mast is abaft the main-mast.

Master, or Captain of a Ship, the person intrusted with the care and navigation of a ship.

"The *M.* is the confidential servant or agent of the owners: and in conformity to the rules and maxims of law the owners are bound to the performance of every lawful contract made by him relative to the usual employment of the ship." — *Abbott on the Law of Shipping*. From this rule of law it follows that the owners are bound to answer for a breach of contract, though committed by the *M.* or mariners against their will and without their fault. Nor can the expediency of this rule be doubted. The owners, by selecting a person as *M.*, hold him forth to the public as worthy of trust and confidence. And in order that this selection may be made with due care, and that all opportunities of fraud and collusion may be obviated, it is indispensable that they should be made responsible for his acts. The *M.* has power to hypothecate, or pledge, both ship and cargo for necessary repairs executed in foreign ports during the course of the voyage; but neither the ship nor cargo can be hypothecated for repairs executed at home. The *M.* has no lien upon the ship for his wages, nor for money advanced by him for stores or repairs. He is bound to employ his whole time and attention in the service of his employers, and is not at liberty to enter into any engagement for his own benefit that may occupy any portion of his time in other concerns; and, therefore, if he do so, and the price of such engagement happen to be paid into the hands of his owners, they may retain the money, and he cannot recover from them. Wilfully destroying or casting away the ship, or procuring the same to be done by the *M* or mariners, to the prejudice of the owners, freighters, or insurers, running away with the cargo, and turning pirates, are offences punishable by imprisonment. After the voyage has been commenced, the *M.* must proceed direct to the place of his destination without unnecessarily stopping at any intermediate port, or deviating from the shortest course. No such deviation will be sanctioned unless it has been occasioned by stress of weather, the want of necessary repair, avoiding enemies or pirates, succoring of ships in distress, sickness of the *M.* or mariners, or the mutiny of the crew. To justify a deviation, the necessity must be real, inevitable, and imperious: and it must not be prolonged one moment after the necessity has ceased. A deviation without such necessity vitiates all insurances upon the ship and cargo, and exposes the owners to an action on the part of the freighters. If a ship be captured in consequence of deviation, the merchant is entitled to recover from the owners the prime cost of the goods, with shipping charges; but he is not entitled to more, unless he can show that the goods were enhanced in value beyond the sum above mentioned. — By the common law, the *M.* has authority over all the mariners on board the ship, — it being their duty to obey his commands in all lawful matters relating to the navigation of the ship and the preservation of good order. But the *M.* should in all cases use his authority with moderation, so as to be the father, not the tyrant, of his crew. On his return home he may be called upon, by action of law, to answer to a mariner he has either beat or imprisoned during the course of the voyage; and unless he show sufficient cause for chastising the mariner, and also that the chastisement was reasonable and moderate, he will be found liable in damages. Should the *M.* strike a mariner without cause, or use a deadly weapon as an instrument of correction, and death ensue, he will be found guilty, according to the circumstances of the case, either of manslaughter or murder. The *M.* may by force restrain the commission of great crimes; but he has no jurisdiction over the criminal. His business is to secure his person, and to deliver him over to the proper tribunals on his coming to his own country. — The *M.* must not take on board any contraband goods by which the ship and other parts of the cargo may be rendered liable to forfeiture and seizure. Neither must he take on board any false or colorable papers, as these might subject the ship to the risk of capture or detention. But it is his duty to procure and keep on board all the papers and documents required for the manifestation of the ship and cargo by the law of the countries from and to which the ship is bound, as well by the law of nations in general as by treaties between particular States. These papers and documents cannot be dispensed with at any time, and are quite essential to the safe navigation of neutral ships during war. — The most difficult part of the *M* 's duty is when, through the perils of the sea, the attacks of enemies or pirates, or other unforeseen accidents, he is prevented from completing his voyage. If his ship have suffered from storms, and cannot be repaired within a reasonable time, and if the cargo be of a *perishable nature*, he is at *liberty* to employ another ship to convey it to the place of destination. He may do the same if the ship have been wrecked and the cargo saved, or if his own ship be in danger of sinking, and he can get the cargo transferred to another; and in *extreme cases* he is at liberty to dispose of the cargo for the benefit of its owners. But the disposal of the cargo by the *M.* is a matter that requires the utmost caution on his part. He should always bear in mind that it is his *duty to convey it to the place of destination*. This is the purpose for which he has been intrusted with it, and this purpose he is bound to accomplish by every reasonable and practical method. What, then, is the *M.* to do, if, by any disaster happening in the course of his voyage, he is unable to carry the goods to the place of destination, or to deliver them there? To this, as a general question, we apprehend no answer can be given. Every case must depend upon its own peculiar circumstances. The conduct proper to be adopted with respect to perishable goods will be improper with respect to a cargo not perishable. One thing may be fit to be done with fish or fruit, and another with timber or iron; one method may be proper in distant regions, another in the vicinity of the merchant; one in a frequented navigation, another on unfrequented shores. The wreck of the ship is not necessarily followed by an impossibility of sending forward the goods, and does not of itself make their sale a measure of necessity or expedience; much less can the loss of the season, or of the proper course of the voyage, have this effect. An unexpected interdiction of commerce, or a sudden war, may defeat the adventure and oblige the ship to stop in her course; but neither of these events doth of itself alone make it necessary to sell the cargo at the place to which it may be proper for the ship to resort. In these and many other cases, the *M.* may be discharged of his obligation to deliver the cargo at the place of destination; but it does not therefore follow that he is authorized to sell it, or ought to do so. What, then, is he to do? In general, it may be said, *he is to do that which a wise and prudent man will think most conducive to the benefit of all concerned*. In so doing he may expect to be safe, because the merchant will not have reason to be dissatisfied; but what this thing will be, no general rules can teach. Some regard may be allowed to the interest of the ship and of its owners; but the interest of the cargo must not be sacrificed to it. Transshipment for the place of destination, if it be practicable, is the first object, because that is in furtherance of the original purpose. If that be impracticable, return or a safe deposit may be expedient. A disadvantageous sale (and almost every sale by the *M.* will be disadvantageous) is the last thing he should think of, because it can only be justified by that necessity which supersedes all human laws. — The *M.* of a ship is liable for goods of which she is robbed in part; and the reason is, lest room should be given for collusion, and the *M* should get himself robbed on purpose, in order that he might share in the spoil. The *M.* is, however, entitled to indemnify himself out of the seamen's wages for losses occasioned by their neglect. — The conditions under which seamen and apprentices are to be taken on board ship, and the obligations of the *M.* with respect to them, are fully set forth in the art. SEAMEN; and it also contains, as already stated, full details as to the conduct which *M.* are bound to pursue in regard to a variety of other particulars. — For the duty of the *M.* as respects custom-house regulations, see the articles, BILL OF LADING, CONSUL, INVOICE, IMPORTATION AND EXPORTATION, SMUGGLING, etc.

Master-Wort, a common name for the *Imperatoria ostruthium*, the root of which is acrid and bitter; it has been used for toothache, and commended as a remedy for intermittent fever.

Mastic, a resinous substance, the produce of the *Pistacia lentiscus*, a native of the Levant and particularly abundant in the island of Chios. It is obtained by making transverse incisions in the trunks and branches of the trees, whence the mastic slowly exudes. The best is in the form of dry, brittle, yellowish, transparent tears; it is nearly inodorous, except when heated, and then it has an agreeable odor; chewed, it is almost insipid, feeling at first gritty, and ultimately soft; its virtues are trifling. It makes an excellent varnish upon

pictures, and was largely used for this and other purposes, but is now to a great extent superseded by the resin damar.

Masticot, a light yellow pigment prepared from tin.

Mat, Matting, a texture made by interweaving strips of reeds, the bark of trees, flags, rushes, grass, rattans, etc. In this country mats are used for a great variety of purposes. The coarser sort are very largely employed in the packing of furniture and goods; in the storage of corn and various other articles on board ship; in horticultural operations; in covering the floors of churches and other public buildings, etc. The finer sorts are principally employed in covering the floors of private houses. In Europe, mats are principally manufactured for sale in Russia, where their production is a prominent branch of national industry. They consist of the bark of the lime or linden tree, and are known in this country by the name of *bast* mats. Archangel is the principal port for the shipment of mats; and it appears that at an average of the years 1851 and 1852, the export of mats from that port amounted to 615,360 pieces a year. Large quantities are also shipped from Petersburg, Riga, and other ports; and most descriptions of Russian produce sent abroad are packed in mats. Various descriptions of reed mats are extensively manufactured in Spain and Portugal; some of them being very beautifully varied. In Spain large quantities of matting are made of the Esparto rush. Rush floor-mats, and rattan table-mats of a very superior description, are brought from China. They should be chosen clean, of a bright, clear color, and should, when packed, be thoroughly dry. The mats of the Japanese are soft and elastic, serving them both for carpets and beds; they are made of a peculiar species of rush cultivated for the purpose. The bags in which sugar is imported from the Mauritius consist of matting formed of the leaves of a tree growing in the island, interwoven in broad strips. They are very strong and durable, and may be washed and cleaned without sustaining any injury. Being imported in large quantities, they are sold very cheap. — Mats for cleaning shoes at a door are various. They usually are rugs of straw, rushes, husks, cocoa-nut, coir, jute, junk, or hemp; a tufted fabric of these materials or of wool; a skin with the hair or wool on; a set of slats, etc.: they are also extensively made of india-rubber.

Imp. duty: bast, or bass, 20 per cent; cocoa, cocoa-nut, coir, flag, jute, or grass, 30 per cent; palm-leaf, 35 per cent; cocoa, cocoa-nut, or coir, with wool border, 45 per cent; rugs of hair and cotton mixed, and all others not exclusively of vegetable material, 45 per cent; sheepskin, 45 per cent; india-rubber (see INDIA-RUBBER).

Matanzas. See CUBA.

Match, a splint or strip of wood or other combustible material, dipped at one end in a composition that ignites by friction. The manufacture of these useful and marvellously cheap articles marked a curious stage in the progress of civilization, when luxuries first became conveniences, and afterwards necessaries. The friction of two pieces of dry wood we now regard as a barbarous mode of procuring light; yet it is a scientific one, when the materials for a quicker process are wanting. The flint and steel were long the only means of getting fire, and we are not very far from the time when the sulphur-tipped match, arranged in bundles, spread out in a fan-like manner, formed the stock in trade of many an itinerant dealer. As mechanical ingenuity supplied the flint and steel and tinder-box, to supersede the rubbing-sticks, so has chemical ingenuity made a wide step in advance, by showing how to tip the little splints or matches with a composition which will kindle by slight friction. Whether called *Congreves*, *Lucifers*, or *Instantaneous lights*, these small but valuable articles are now made in almost inconceivable quantities, furnishing employment in this country to large numbers of men, women, and children. American matches are largely exported to the West Indies, Mexico, South America, etc. The value of exports for the year 1879 was $127,335.

Hand-cutting has long been insufficient to produce the splints in sufficient quantities; nothing less than steam-power can do this. The best wood for matches is clear white pine. It is first sawed into blocks about 12 inches long, 5 or 6 inches wide, and 3 thick. Several of these blocks are placed in a machine, where a number of revolving cutters, worked with great rapidity, slice the blocks up into layers, and cut the layers into splints. One machine will cut up two million splints in a day. The splints, as liberated from the machine, slide down into another room, where women and girls tie them up in boxes, the boxes in parcels, and the parcels in bundles. These splints are sold by the *hogshead* to the match-makers, each hogshead containing perhaps two million splints. To make *round* splints a thick steel plate is perforated very closely with holes, the edges of which are made as keen as possible. A block of wood, with the grain in the proper direction, is pressed with great force against the plate, which separates it into little cylindrical rods by the action of the perforation. — To the *Instantaneous-light box*, which consists of a small tin box containing a bottle, in which was placed some sulphuric acid, with sufficient fibrous asbestos to soak it up and prevent its spilling out of the bottle, and a supply of properly prepared matches, succeeded the *Lucifer*, invented about 1834, which was coated with a mixture of sulphide of antimony and chlorate of potash made into a paste with gum-water, and ignited by drawing between the surfaces a folded piece of sand-paper. The lucifer was superseded in 1842 by the *Congreve*, in which phosphorus was substituted for sulphide of antimony. This is the match now generally used. The body of the match is usually of wood, but some, called *Vestas*, are of very thin wax-taper. The composition consists of phosphorus and nitre, or phosphorus, sulphur, and chlorate of potash, mixed with melted gum or glue, and covered with vermilion, red-lead, umber, soot, and other coloring material. The proportions are almost as varied as the manufacturers are numerous. A very good composition consists of phosphorus 4 parts, nitre 10, fine glue 6, red ochre 5, and smalt 2 parts. The Congreve match requires only a slight friction to ignite it, for which purpose the bottom, or some other part of the box, is made rough by attaching a piece of sand-paper, or covering it, after wetting it with glue, with sand Matches are now frequently made without sulphur, paraffine oil being used for saturating the wood. Amadou, or German tinder, is largely made in Europe into Congreve matches or fusees, as they are often called, for the use of smokers, to light their pipes or cigars. In large establishments, the manufacture of matches is now entirely accomplished by machinery. Blocks of a two-inch prime plank, sawed up the length of the match, which is 2½ in., are delivered to a cutting-machine, which cuts 12 matches by a first stroke, and by the succeeding one pushes them into slats arranged on a double chain, 250 ft. long, which carries them to the sulphur-vat, thence to the phosphorus-vat, and thus across the room and back, returning them at a point in front of the cutting-machine, where they are gathered into trays by a boy in their natural order, and sent to the packing-room. 1,000 gross or 144,000 small boxes of matches are thus made in a day. — *Safety lucifer matches* differ from the Congreves in leaving out the phosphorus from the composition applied to the match, and, instead, mixing it with the sand on the friction surface, thus separating this highly inflammable material from its intimate and dangerous connection with the sulphur and chlorate of potash. This simple invention, though removing all the objections from the use of chemical matches, has not become popular in this country. — The manuf. of matches is very dangerous, on account of the inflammable nature of the ingredients. It is also unwholesome, owing to the fumes from the phosphorus, chiefly for the dippers, who are to stand for hours over the heated slab upon which the phosphorus is spread. — Match is also a material employed in firing mines, etc. *Slow-match* consists merely of hempen rope loosely twisted, and dipped in a solution of saltpetre and lime-water. It burns at the rate of one yard in three hours. *Quick-match* is merely cotton coated with a composition of mealed powder, gum, and water. When not confined, it burns at the rate of one yard in thirteen seconds

Imp. duty: Matches of cotton, wax, and paper, 35 per cent.

Match-Cloth, a coarse kind of cloth.

Mate, in a merchant-ship, the deputy of the master, taking, in his absence, the command. There is sometimes only one, and sometimes two, three, or four mates in a merchantman, according to her size, — denominated first, second, third, etc.,

mates. The law, however, recognizes only two descriptions of persons in a merchantman, — the master and mariners; the mates being included in the latter, and the captain being responsible for their proceedings. The *M.* is the next to the master on board, and upon his death or absence the *M.* succeeds, *virtute officii*, to the care of the ship and the government and management of the crew. He does not cease to be *M.* in such cases, but has thrown upon him, cumulatively, the duties of master. He is *quasi* master, with the same general powers and responsibilities, *pro hac vice*, and with the preservation of his character and privileges as *M.* He may sue in the admiralty for his wages as *M.*, and is entitled, in that character, to be cured, if sick, at the expense of the ship. The master, and even the consignees, may appoint a substitute in a foreign port, in cases of necessity. Even a supercargo, in cases of necessity, and acting with reasonable discretion, may bind the owner. See MASTER.

Maté. See PARAGUAY TEA.

Matelot [Fr.], a seaman.

Materials, the substances or fabrics from which anything is to be made up. Raw *M.* is a trade term for products imported or sold for subsequent preparation and use in manufactures.

Materia Medica, a knowledge of drugs and their uses; a dispensatory or work treating of the properties and uses of pharmaceutical preparations (animal or mineral) and medicinal plants.

Math, a storage crop; aftermath being the second crop of grass.

Mathematical Instruments, a collective trade name for a variety of instruments, including compasses, slide-rules, theodolites, chains, scales, etc., and the sale of which is usually combined with philosophical instruments, or those used in physical sciences.

Matico, the leaves of a Peruvian plant, the *Artanthe elongata*, used as a powerful styptic, and for other medicinal purposes.

Maties, a name for the first quality of Scotch cured herrings, being those fish in which the roes and melts are perfectly but not largely developed.

Matrass, a glass vessel, egg-shaped in form, or tapering into a conical figure, with a long neck, and sometimes furnished with a tubulure. It is used in pharmacy for distilling or digestive purposes.

Matrix, (plural **Matrices**), a mould for casting, used by type-founders and others; a cavity of shape in which anything is formed.

Matron, a female superintendent.

Matt, in gilding, the dead appearance of the gold-leaf pressed upon the size, before being rubbed with the burnisher. In metallurgy, see COPPER (SMELTING). — Also a name given to a bale of flax; the Russian *M.* is about five or six cwt.; the Dutch *M.* is only 126 lbs.

Matter, in printing, written manuscript prepared for setting up in type; copy; also, type set up preparatory to being used in printing. *Dead-matter* is type ready for distribution in case after printing, while *live-matter* is type set up, but which has, as yet, not been printed from.

Matting. See MAT.

Mattock, a pickaxe with broad ends.

Mattress, a bed stuffed with hair, wool, cotton, moss, etc., and quilted.

Maturity, the time when bills of exchange or promissory notes fall due, or are legally payable.

Maty, a servant of all work in Southern India.

Maud, a species of wrapping plaid or shawl, made of undyed or natural brown wool of different kinds and countries. *M.* are used as wrappers for the shoulders in walking, or for the knees in driving; also a gray striped plaid worn by shepherds in the South of Scotland.

Maui. See HAWAIIAN ISLANDS.

Maul, or **Beetle**, a heavy wooden hammer used for driving wedges; also an iron hammer adapted for driving bolts, etc.

Maul-Stick, Mahl-Stick, a wooden rod used by painters to steady the right hand while working.

Maund, a variable East Indian weight in different localities, but divided into 40 seers. The ordinary Indian bazaar *M.* is 82$\frac{2}{7}$ lbs.; the Bengal factory *M.* is 74 lbs. 10 oz. 10 dr.; the Madras *M.* is only 25 lbs.; the Bombay *M.* is 28 lbs.; the Surat *M.* is 41 lbs. The Turkish *batman*, or *M.*, is at Constantinople 19$\frac{1}{5}$ lbs.; at Smyrna, 16$\frac{7}{8}$ lbs.; at Tauris, 5 lbs.; at Bokhara, 291 lbs.

Maundril, a prying pick with two shanks, used in mining.

Mauney, an East Indian land measure of 2,400 sq. feet.; the 24th part of a cauney; it is also called a ground.

Mauritius (formerly **Isle of France**), a British island lying in the Indian Ocean, about 600. m. E. of Madagascar, between lon. 57° 17′ and 57° 48′ E., lat. 20° and 20° 30′ S., comprising an area of 704 sq. m., without the Seychelles group, Rodrigues, and a number of other small dependencies, about 60 in number, having a superficies of 350 sq. m. The resident population in 1878 was 348,625, of whom 237,468 were Indians, originally coolies imported for working the sugar estates, and about 14,000 in the dependent islands.

The island is in general mountainous, the land rising from the coast towards the centre; and a considerable portion of the interior is composed of an extended table-land. The climate on the elevated plains is very moist, but on the whole the island is salubrious, and indeed is visited on this account by invalids from India. The chief disadvantage under which it labors is its great exposure to hurricanes. These occur mostly between December and May, a period corresponding nearly with the rainy season. *M.* is not generally a fertile island, and it is dependent for provisions on India, the Cape, and other places; but in some parts the soil is exceedingly rich, and tropical commodities are produced in great abundance. The planters give chiefly their attention to the sugar-cane, of which 119,450 English tons were produced in 1877, 137,465 in 1878, and 132,775 in 1879. The other productions are rum, vanilla, and aloe fibre.

Port Louis, the capital and principal port of the island, is situated in lat. 20° 9′ 56″ S., lon. 57° 28′ 41″ E., at the bottom of a triangular bay, the entrance of which is rather difficult. It is a very convenient port for careening and repairing, but in the hurricane months the anchorage is not good, and it can then accommodate very few vessels. There is a dry dock capable of taking in a vessel 365 ft. long; it is 80 ft. wide at the top, and 40 at bottom, and has 23 ft. of water in the sill at high tide. Two light-houses have been completed, — the main light on Flat Island, with a subsidiary one on Cannonier Point. Mail-steamers arrive monthly. Pop. 40,000.

Mauve-Color. See ANILINE (VIOLET).

Maw, the stomach of an animal; the stomachs of sucking calves, salted and dried, and known as *maw-skins*, furnish rennet in cheese-making; the stomachs of fishes enter into commerce in the East, under the name of fish-maws.

Maw-Seed, a name under which French poppy-seed is sold by meal-men for cage-birds.

Maximum, the greatest quantity or highest price paid or obtained for an article, etc.

Mayaguez. See PORTO RICO.

May-Duke, a kind of cherry.

Mayence. See HESSE.

Mazagan, a kind of bean.

Mazard, a small dark black cherry.

Mazarine, a deep-blue color.

Mazatlan. See MEXICO.

Mazer, a drinking-cup made of maple-wood.

M. D., "Doctor of Medicine"; also, in Roman numerals, 1,500.

Mead, Metheglin [Fr. *hydromel*, Ger. *Meht*], a wine, or beer, made from fermented honey and water. It was for a long time the favorite drink of the northern nations.

Meadow, a field under grass cultivation; grass-land mown for hay.

Meadow-Saffron. See COLCHICUM.

Meadow-Sweet, a wild plant, the *Spiræa ulmaria*, or queen of the meadows, the roots of which are astringent, and the flowers yield a fragrant distilled water, which is said to be used by wine-merchants to improve the flavor of home-made wines.

Meal [Fr. *farine*; Ger. *Mehl*; It. and Sp. *farina*], the edible part of Indian corn, oats, barley, and pulse of different kinds, ground into a species of coarse flour. This term is rarely used for ground rye, and never for ground wheat.

Mease, 500 herrings. See MACE.

Measure, a stated or fixed quantity, dimension, or extent, as settled by a rule or standard; in legal and commercial sense, a certain quantity or portion of anything bought, sold, valued, or the like. See WEIGHTS AND MEASURES, and METRIC SYSTEM. — An instrument for finding weight or length. — The size of a suit of clothes, or shoes, hat, etc. — Also applied to strata or beds, as the *coal-measures*.

Measurement-Goods, light goods taken on freight by bulk, or the cubic dimensions of the packages, in contradistinction to ponderous goods, which are usually charged by weight.

Measurer, a person appointed to superintend the measurement of various bulk articles, as lumber, coal, etc.

Measuring-Machine, a machine or instrument by which length, or "end measurement," can be ascertained with extreme accuracy.

Fig. 346 represents a *M.-M*, invented by Joseph Whitworth, intended for practical uses in the workshop, to test the dimensions of pieces of metal when great precision is required. The base of the machine is constructed of a rigid cast-iron bed bearing a fixed head-stock, *A*, and a movable one, *B*, the latter sliding along the bed, *C*, with a slow movement, when the handle, *D*, is turned. This slow motion is produced by a screw on the axis, *a*, working in the lower part of the head-stock, just as the slide-rest is moved along the bed of the lathe. The movable head-stock, when it has been moved into the position required, is firmly clamped by a thumb-screw. The face of the bed is graduated into inches and their subdivisions. Here it should be explained that the machine is not intended to be used for ascertaining the absolute dimensions of objects, but for showing by what fraction of an inch the size of the work measured differs from a certain standard piece. Each head-stock carries a screw of $\frac{1}{20}$ inch pitch, made with the greatest possible care and accuracy. To the head of the screw in the movable head-stock is attached the wheel, *b*, having its circumference divided into 250 equal parts, and a fixed index, *c*, from which its graduations may be counted. An exactly similar arrangement is presented in connection with the screw turning in the fixed head-stock, but the wheel is much larger, and its circumference is divided into 500 equal parts. It follows, therefore, that if the large wheel be turned so that one division passes the index, the bar moves in a straight line $\frac{1}{500}$ of the $\frac{1}{20}$ of an inch, that is, $\frac{1}{10000}$ of an inch. The ends of the bars, *d* and *e*, are formed with perfectly plane and parallel surfaces, and an ingenious method is adopted of securing equality of pressure when comparisons are made. A plate of steel, with perfectly parallel faces, called a *gravity-piece*, or *feeler*, is placed between the flat end of the bar and the standard-piece, and the pressure when the screw-reading is taken must be just sufficient to prevent this piece of steel from slipping down, and that is the case when the steel remains suspended and can nevertheless be easily made to slide about by a touch of the finger. Thus, any piece which, with the same screw-readings, sustains the gravity-piece in the same manner as the standard, will be of exactly the same length; or the number of divisions through which the large wheel must be turned to enable it to do so tells the difference of the dimensions in ten-thousandth parts of an inch. By this instrument, therefore, gauges, patterns, etc., can be verified with the greatest precision, and pieces can be reproduced perfectly agreeing in their dimensions with a standard-piece. Thus, for example, the diameters of shafting can be brought with the greatest precision to the exact size required to best fit their bearings.

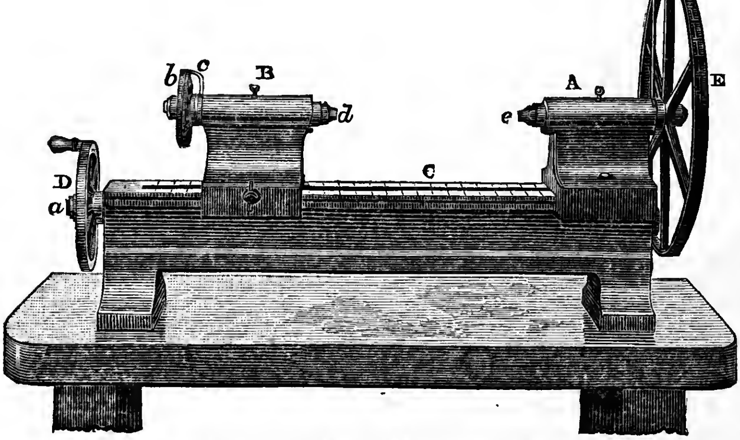

Fig. 346. — WHITWORTH'S MEASURING-MACHINE.

Meat, the flesh of animals used as food. Under the plural *meats* are quoted, in price-currents, beef (sides and fore and hind quarters), mutton (carcasses), dressed pork, and cut meats. See CATTLE (NEAT), and PRESERVED MEAT.

Extract of Meat. The eminent chemist, Liebig, suggested some years ago the manufacture of a concentrated extract of meat, in which only the lean or muscular part is used. This is boiled until all but the fibre is dissolved out; and then the liquid is concentrated until it is brought to the state of a thick paste, in which state it is easily preserved. It is chiefly recommended for use by invalids, and for quickly making soups. The favor with which this and other forms of meat extracts were received is now diminishing, and it is even stoutly maintained that they are inferior to the beef-tea prepared in the old-fashioned way. It is asserted that neither directly nor indirectly should extracts of meat be considered as food, for they neither contain albuminous constituents, nor do they in any way prevent the waste of the organic matter which forms the body, as they contain none of the nitrogenous principles which arrest decay. In small doses, these extracts promote digestion, and increase the circulation by the stimulating effect of the salts of potash they contain; but in strong doses, especially if the system be weakened by long abstinence, as in the case of convalescents from severe illness, they may produce very injurious effects. In such cases, the system has lost a large quantity of chloride of sodium, and the potassa salts will therefore, instead of performing nutrition, interfere with it, by their direct action on the blood-globules, whereby the absorption of oxygen is greatly decreased, and by the predominance of such salts in the serum of the blood, which only dissolve carbonic acid, and do not allow the normal quantity of that gas to be eliminated, thus impeding the access of oxygen, diminishing the circulation, and producing congestion.

Meat-Biscuit, a portable or concentrated preparation of meat, pounded and dried, and mixed with meal and baked.

Meat-Chopper, a machine for mincing meat for sausages and stewing.

Meat-Hook, a hook for hanging meat on in a larder or in a butcher's stall.

Meat-Mangler, a device for making steak tender.

Meat-Screen, a metal screen placed behind meat roasting at the fire, to keep in the heat.

Mecca. See ARABIA.

Mecca-Balsam, a choice oleo-resin, obtained from the *Balsamodendron gileadense.*

Mechanic, a skilled workman or artisan; a handicraftsman; one who plans or makes machinery.

Mechanical Engineer, a practical mechanist; an engineer who understands the construction and working of machinery.

Mechanical Powers. The simple *M. P.* are six in number, viz. the *Lever*, the *Pulley*, the *Wheel and Axle*, the *Inclined Plane*, the *Wedge*, and the *Screw.* All machines are formed by combinations to a greater or less extent of these six elements. The mechanical effects, however, of the whole, are ultimately resolvable into that of the lever. By means of the *M. P.* a great weight may be sustained, or a great resistance slowly overcome, by the application of a small force. Or, a great velocity may be imparted to a small weight or resistance, by the use of a great force or power.

Mechanics, the science which treats of forces and their applications.

Mechanics' Fire-Insurance Co., located in Brooklyn, N. Y., and organized in 1857. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $150,000; net surplus, $163,596.24; premiums, $70,086.18. Premiums received since the organization of the Co., $1,947,545.18; losses paid, $862,-942.27; cash dividends paid to stockholders, $484,000.

Mechanics' Mutual Insurance Co., located in Boston, Mass., and organized in 1878. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $6,845.45. Premiums received since the organization of the Co., $54,762.62; losses paid, $26,521.14.

Mechanics and Traders' Fire-Insurance Co., located in New York City, and organized in 1853. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $238,166.64; premiums, $128,947.66. Premiums received since the organization of the Co., $3,587,703.66; losses paid, $2,037,740.83; cash dividends paid to stockholders, $888,000.

Mechin, a sheepskin leather made in Roumelia.

Mechlin Lace, a beautiful light Belgian lace, which has a six-sided mesh, of three flax threads, twisted and plaited to a perpendicular line, the pattern being worked in the net, and the plait thread surrounding the flowers.

Mecklenburg-Schwerin, a grand duchy of N. Germany, between lat. 53° 7′ and 54° 20′ N., lon. 10° 37′ and 13° 15′ E., having N. the Baltic, E. Pomerania and Mecklenburg-Strelitz, S. the prov. of Brandenburg, W. Luneburg and Lauenburg, and part of Mecklenburg-Strelitz; area, 4,834 sq. m.; capital, Rostock (pop. 27,989). The government is an hereditary monarchy.

The country is generally level and fertile; agriculture is the chief employment of the people. The horses and horned cattle, which are both numerous and excellent, find a ready sale in every part of Germany. The manufactures are inconsiderable. In 1879 the public debt was estimated at 42,000,000 marks, or $10,500,000, a large part of which sum had been raised in loans for the construction of railways. There has been a gradual decrease of population in recent years, although the average density is only 114 inhabitants per sq. m., and the soil moreover very fertile. At the census of 1867 the population of the grand duchy numbered 560,628, and at the next enumeration, of 1871, the number had fallen to 557,707, being a decrease of 2,921, or one half per cent of the pop. in the four years 1867-71. At the census of 1875 the pop. was found to have further declined to 553,785, being a loss of 3,922, or of 0.18 per cent per annum. During the six years from 1873 to 1878, the large number of 10,664 emigrants left the little State. The foreign trade, which is much checked by the vicinity of Hamburg and Lubeck, is chiefly conducted at the ports of Rostock and Wismar, which are given under GERMANY (SEA-PORTS).

Mecklenburg-Strelitz, another grand duchy of N. Germany, consisting of two separate territorial divisions: the first and largest, or the duchy of Stargard, lying between lat. 53° 9′ and 53° 47′ N., and lon. 12° 40′ and 13° 57′ E., having W. Mecklenburg-Schwerin, and surrounded on all other sides by the Prussian territories; the second, or principality of Ratzeburg, between lat. 53° 40′ and 53° 51′ N., and lon. 10° 39′ and 11° E. United area, 997 sq. m. The general features of the country are the same as those described in the above article, and the pop., which numbered 95,673 in 1875, is diminishing in a still larger proportion. The capital is New Strelitz. This State being situated at a distance from the ocean, and of small size, it possesses no commercial interest.

Medal, the name applied to those coins that are cast on some especial occasion to celebrate some important or remarkable event; or as an honorary reward given for scientific merit; or as a distinction granted for public service, to be worn on the breast.

The chief distinction between a *M.* and a coin is, that the former is usually larger than the latter, and in higher relief. The stamping of a bold *M.* can seldom be effected with one blow, two or more being needed, and the *M.* annealed between whiles. In stamping, a press is used having a large wheel attached horizontally to the top of a strong and finely threaded vertical screw, and a bed on which the die is placed. The blank which is to become a *M.* being laid in or on the die, the wheel is set to work; this brings down the screw, and an intense pressure acts on the blank. If of soft metal, one blow will suffice: if hard, two or more. Some bronze medals of large size and bold relief have required as many as thirty blows. See DIE-SINKING and MINT

Imp. free.

Medallion, a small painting or carving; a medal of large size.

Medical Electricity, the therapeutical application of the various kinds of electricity.

Medical Rubber, a coarse unbleached flax towelling, used for drying the body after bathing.

Medicated Spirits, alcohol flavored with some strong ingredient.

Medicinal Preparations are compound medicines, prepared according to a formula adopted in the Dispensatories or Pharmacopœias of the country. Medicinal preparations made according to secret or unrecognized formulæ are usually called patent medicines. Both are subject to the same stamp duty, by the Internal Revenue Laws in force after the Act of Congress of June 6, 1872, which are here given in full: —

(Act of June 30, 1864.) All the provisions of this act, relating to dies, stamps, adhesive stamps, and stamp duties, shall extend to and include (except when manifestly impracticable) all the articles or objects enumerated in schedule marked C, subject to stamp duties, and apply to the provisions in relation thereto.

SCHEDULE C.*

1. *Medicines or Preparations.* For and upon every packet, box, bottle, pot, phial, or other enclosure, containing any pills, powders, tinctures, troches, lozenges, sirups, cordials, bitters, anodynes, tonics, plasters, liniments, salves, ointments, pastes, drops, waters, essences, spirits, oils, or other medicinal preparations or compositions whatsoever, made and sold, or removed for consumption and sale, by any person or persons whatever, wherein the person making or preparing the same

* Schedule C is here given in full, though including articles which are out of place, as being a more appropriate and convenient arrangement for reference.

has, or claims to have, any private formula or occult secret or art for the making or preparing the same, or has, or claims to have, any exclusive right or title to the making or preparing the same, or which are prepared, uttered, vended, or exposed for sale under any letters-patent, or held out or recommended to the public by the makers, venders, or proprietors thereof as proprietary medicines or as remedies or specifics for any disease, diseases, or affections whatever affecting the human or animal body: and —

2. *Perfumery and Cosmetics.* For and upon every packet, box, bottle. pot. phial, or other enclosure, containing any essence, extract, toilet-water, cosmetic, hair-oil, pomade, hair-dressing, hair restorative, hair-dye, tooth-wash, dentifrice, tooth-paste, aromatic cachous, or any similar articles, by whatsoever name the same heretofore have been, now are, or may hereafter be called, known, or distinguished, used or applied, or to be used or applied as perfumes or applications to the hair, mouth, or skin, made, prepared, and sold or removed for consumption and sale in the United States:

Where such packet, box, bottle, pot, phial, or other enclosure, with its contents, shall not exceed, at the retail price or value, the sum of 25 cts., 1 ct. — When above 25 cts., but not above 50 cts., 2 cts — When above 50 cts., but not above 75 cts., 3 cts. — When above 75 cts., but not above $1, 4 cts. — For every 50 cts., or fractional part of it over and above $1, 2 cts.

3. *Friction Matches*, or lucifer-matches, or other articles made in part of wood, and used for like purposes, in parcels or packages containing 100 matches or less, for each parcel or package, 1 ct. — When in parcels or packages containing more than 100 and not more than 200 matches, for each parcel or package, 2 cts. — And for every additional 100 matches or fractional part thereof, 1 ct — For wax tapers, double the rates herein imposed upon friction or lucifer matches; on cigar lights, made in part of wood, wax, glass, paper, or other materials, in parcels or packages containing 25 lights or less in each parcel or package, 1 ct. — When in parcels or packages containing more than 25 and not more than 50 lights, 2 cts. — For every additional 25 lights or fractional part of that number, 1 ct. additional.

4. *Playing Cards.* For and upon every pack, not exceeding 52 cards in number, irrespective of price or value, 5 cts.

(Acts of June 30, 1864, March 3, 1865, July 13, 1866, July 20, 1868) If any person, firm, company, or corporation shall make, prepare, and sell, or remove for consumption or sale, drugs, medicines, preparations, compositions, articles, or things, including perfumery, cosmetics, lucifer or friction matches, cigar lights, or wax tapers, and playing cards, whether of domestic manufacture or imported, upon which a duty or tax is imposed by law, as enumerated and mentioned in schedule C, without affixing thereto an adhesive stamp or label denoting the tax before mentioned, he or they shall incur a penalty of $50 for every omission to affix such stamp. — Every manufacturer or maker of any of the articles for sale mentioned in schedule C, after the same shall have been so made, and the particulars hereinbefore required as to stamps, have been complied with, who shall take off, remove, or detach, or cause, or permit, or suffer to be taken off, or removed, or detached, any stamp, or who shall use any stamp, or any wrapper or cover to which any stamp is affixed, to cover any other article or commodity than that originally contained in such wrapper or cover, with such stamp when first used, with the intent to evade the stamp duties, shall for every such article, respectively, in respect of which any such offence shall be committed, be subject to a penalty of $50, to be recovered together with the costs thereupon accruing; and every such article or commodity as aforesaid shall also be forfeited. — Every maker or manufacturer of any of the articles or commodities mentioned in schedule C, as aforesaid, who shall sell, expose for sale, send out, remove, or deliver any article or commodity, manufactured as aforesaid, before the duty thereon shall have been fully paid, by affixing thereon the proper stamp, as provided by law, or who shall hide or conceal, or cause to be hidden or concealed, or who shall remove or convey away, or deposit, or caused to be removed or conveyed away from or deposited in any place, any such article or commodity, to evade the duty chargeable thereon, or any part thereof, shall be subject to a penalty of $100, together with the forfeiture of any such article or commodity. — All medicines, preparations, compositions, perfumery, cosmetics, cordials, and other liquors manufactured wholly or in part of domestic spirits, intended for exportation, as provided for by law, in order to be manufactured and sold or removed, without being charged with duty, and without having a stamp affixed thereto, shall, under such rules and regulations as the Secretary of the Treasury may prescribe, be made and manufactured in warehouses similarly constructed to those known and designated in Treasury regulations as bonded warehouses, class two: *Provided*, That such manufacturer shall first give satisfactory bonds to the collector of internal revenue for the faithful observance of all the provisions of law and the rules and regulations as aforesaid, in amount not less than half of that required by the regulations of the Secretary of the Treasury from persons allowed bonded warehouses. Such goods, when manufactured in such warehouses, may be removed for exportation, under the direction of the proper officer having charge thereof, who shall be designated by the Secretary of the Treasury, without being charged with duty, and without having a stamp affixed thereto. Any manufacturer of the articles aforesaid, or of any of them, having such bonded warehouse, as aforesaid, shall be at liberty, under such rules and regulations as the Secretary of the Treasury may prescribe, to convey therein any materials to be used in such manufacture which are allowed by the provisions of law to be exported free from tax or duty, as well as the necessary materials, implements, packages, vessels, brands, and labels for the preparation, putting up, and export of the said manufactured articles; and every article so used shall be exempt from the payment of stamp and excise duty by such manufacturer. Articles and materials so to be used may be transferred from any bonded warehouse in which the same may be, under such regulations as the Secretary of the Treasury may prescribe, into any bonded warehouse in which such manufacture may be conducted, and may be used in such manufacture, and, when so used, shall be exempt from stamp and excise duty; and the receipt of the officer in charge, as aforesaid, shall be received as a voucher for the manufacture of such articles. Any materials imported into the U. States may, under such rules as the Secretary of the Treasury may prescribe, and under the direction of the proper officer, be removed in original packages from on shipboard, or from the bonded warehouse in which the same may be, into the bonded warehouse in which such manufacture may be carried on, for the purpose of being used in such manufacture, without payment of duties thereon, and may there be used in such manufacture. No article so removed, nor any article manufactured in said bonded warehouse, shall be taken therefrom, except for exportation, under the direction of the proper officer having charge thereof, as aforesaid, whose certificate, describing the articles by their marks, or otherwise, the quantity, the date of importation, and name of vessel, with such additional particulars as may from time to time be required, shall be received by the collector of customs in cancellation of the bonds, or return of the amount of foreign import duties. All labor performed and services rendered under these regulations shall be under the supervision of an officer of the customs, and at the expense of the manufacturer. — Any article manufactured in a bonded warehouse established under the internal revenue act of June 13, 1864, and located in any of the Atlantic States, may be removed therefrom for transportation to a customs bonded warehouse at any port on the Pacific coast of the U. States, for the purpose only of being exported therefrom, under such rules and regulations and upon the execution of such bonds or other security as the Secretary of the Treasury may prescribe. — Lucifer or friction matches, and cigar lights, and wax tapers may be removed from the place of manufacture for export to a foreign country without payment of tax, or affixing stamps thereto, under such rules and regulations as the Commissioner of Internal Revenue may prescribe; and all provisions of existing laws inconsistent herewith are hereby repealed. — Any person who shall offer or expose for sale any of the articles named in schedule C, or in any amendments thereto, whether the articles so offered or exposed are imported or are of foreign or domestic manufacture, shall be deemed the manufacturer thereof, and subject to all the duties, liabilities, and penalties imposed by law in regard to the sale of domestic articles without the use of the proper stamp or stamps denoting the tax paid thereon, and all such articles imported, or of foreign manufacture, shall, in addition to the import duties imposed on the same, be subject to the stamp tax, respectively, prescribed in schedule C, as aforesaid. — No stamp tax shall be imposed upon any uncompounded medicinal drug or chemical, nor upon any medicine compounded according to the U. States or other national pharmacopœia, or of which the full and proper formula is published in any of the dispensatories now or hitherto in common use among physicians or apothecaries, or in any pharmaceutical journal now issued by any incorporated college of pharmacy, when not sold or offered for sale, or advertised under any other name, form, or guise than that under which they may be severally denominated and laid down in said pharmacopœias, dispensatories, or journals as aforesaid; nor upon medicines sold to or for the use of any person, which may be mixed and compounded for said person according to the written recipe or prescription of any physician or surgeon. But nothing in this section shall be construed to exempt from stamp tax any medicinal articles, whether simple or compounded by any rule, authority, or formula, published or unpublished, which are put up in a style or manner similar to that of patent or proprietary medicines in general, or advertised in newspapers or by public handbills for popular sale and use, as having any special proprietary claim to merit, or to any peculiar advantage in mode of preparation, quality, use, or effect, whether such claim be real or pretended.

Medicinal Waters. See MINERAL WATERS.

Medicine, any substance, simple or compound, that has the property of curing or mitigating disease, or that is used for the purpose. See MEDICINAL PREPARATIONS.

Medicine-Chest, a case with bottles, jars, etc., with an assortment of the more commonly used drugs and medicines, for ship or family use. By the laws of the U. States it is required that every vessel belonging to citizens of the U. States, of the burden of 75 tons or upwards, navigated by six or more persons, and bound from the U. States to any port in the West Indies, or any vessel of the burden of 150 tons or upwards, navigated by ten or more persons, and bound on a voyage without the limits of the U. States, shall be provided with a chest of medicines, put up by some apothecary of known reputation, and accompanied by directions for administering the same; and the said medicines shall be examined by some apothecary once at least in every year, and supplied with fresh medicines in the place of such as shall have been used or spoiled. — *T. McElrath.*

Medida, a Portuguese wine measure, the canada = .703 of a wine gallon.

Mediterranean Sea, an inland sea enclosed by Asia on the east, Africa on the south, and Europe on the north, and communicating with the Atlantic by the Strait of Gibraltar on the west, situated between lat. 30° 20′ and 43° north, and lon. 6° and 37° 30′ E. Within this space is included the Tyrrhenian, Ionian, and Adriatic seas, and the Sea of the Grecian Archipelago. The Sea of Marmora, the Black Sea, and the Sea of Azov, which communicate with it by the Strait of the Dardanelles, are considered as separate seas. The principal rivers which flow into the *M.* are the Ebro, Rhone, Arno, and the Tiber in Europe, and the Nile in Africa. The principal islands are Sicily (which divides the *M.* into an eastern and western portion), Cyprus, Crete, Malta, and the Ionian Islands in the east, and Sardinia, Corsica, and the Balearic Islands in the west. The most important gulfs are Taranto in Italy, Lepanto in Greece, Syrtis and Cabes in Barbary, in the eastern portion; and Valencia in Spain, Lyons in France, Genoa in Italy, and Tunis in Africa, in the west. The winds of this sea are very variable; the most formidable is the *sirocco*, or *solano*, which is very destructive. The tidés are little felt, and very irregular. Fish are abundant in the *M.*, especially tunny, anchovies, pilchards, and mackerel, and the finest coral, sponge, and ambergris are procured.

Medium, middling quality; a size of drawing and writing paper between demy and royal, measuring $22\frac{1}{4} \times 17\frac{1}{4}$ inches; printing paper 19×24 inches, double medium being 24×38 inches.

Medlar, the fruit of the *Mespilus Germanica* (Fig. 347), a large shrub or small tree, native of the South of Europe, but cultivated, though to a very small extent, in this country. It is broader than long, and has a broad hairy disk at the top. It possesses considerable flavor, but does not attain the ripeness fit for use until some time after it has been taken from the tree.

Medley, a mixture.

Medleys, a technical term which includes all wool-dyed colors, excepting blue and black.

Medoc. See CLARET WINES.

Medrinaque, a coarse fibre of sago-palm from the Philippines, formerly much used in lieu of buckram and crinoline for stiffening dress-linings, etc.

Meerschaum [the Ger. *Meerschaum* and the Fr. *écume de mer* both mean sea-foam or sea-froth], a soft earth, the hydrated silicate of magnesia, found in Asia Minor, Greece, Moravia, Spain, and other Mediterranean countries, and somewhat resembling chalk. It is largely used for the manufacture of pipes and cigar-tubes. In the places where it is collected it is cut in lumps, which are first roughly squared into blocks for exportation. Pesth and Vienna are celebrated for the manufacture of *M.* pipes, which, however, are also extensively made in Germany and France.

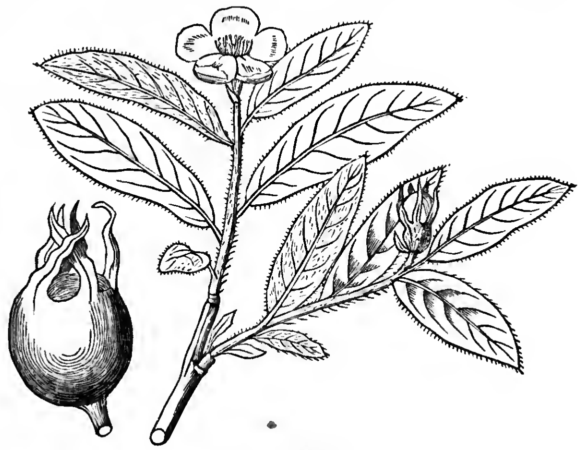

Fig. 347. — MEDLAR.

If quite pure, the substance is delicately white, easily indented by the thumb-nail, and readily cut. If any impurities are with it, they impart a tinge which lessens its value. If hard, the earth is likely to be impure; if soft, it is too porous; and therefore the makers of the best pipes look out for a medium quality between hard and soft. In working it, the substance is soaked in a composition of wax, oil, and fat; and then the cutting and carving are carefully managed, often with a high degree of artistic skill. The parings and scraps are pounded, boiled, and moulded to blocks to form inferior pipes. The cloudy coloring which comes upon a *M.* pipe-bowl after being long smoked is a result of the action of the oil of tobacco upon the wax and oil with which the earth is saturated; it is sometimes imitated artificially by steeping the clay in a solution of iron before the saturation with wax and oil. It is somewhat difficult to distinguish a genuine from an artificial *M.* pipe. The artificial, however, are generally heavier, and of a more equally pure white, blemishes caused by the presence of foreign minerals being frequently seen on real *M.* — *Imp.* duty: crude or raw *M.*, free; *M.* pipes (real or imitation), $1.50 per gross, and 75 per cent.

Megameter, a micrometer.

Megascope, an optical instrument for representing objects on a large scale.

Megass. See CANE-TRASH.

Mégissier, a French leather-dresser.

Melado, sugar in a crude state, containing both saccharine and molasses.

Concentrated *M.*, or *M.* boiled to the point of crystallization, is taxed as manufactured sugar in a green state.

Melanotype. Same as FERROTYPE (which see).

Melbourne. See VICTORIA.

Meles, a commercial name for assorted diamonds, from $\frac{1}{64}$ to $\frac{3}{4}$ of a carat each.

Melicotoon, a peach grafted on a quince stock or tree.

Melilot, a sweet-scented clover, the flowers and seeds of which are used for flavoring the Gruyère cheese.

Melissa. The balm, *Melissa officinalis* (Fig. 348), is a medicinal plant of S. Europe. It has been introduced into this country, where it is

cultivated in gardens, and grows wild along the fences of our roads and lanes. For use the herb should be cut before the appearance of the flowers, which begin to expand in July.

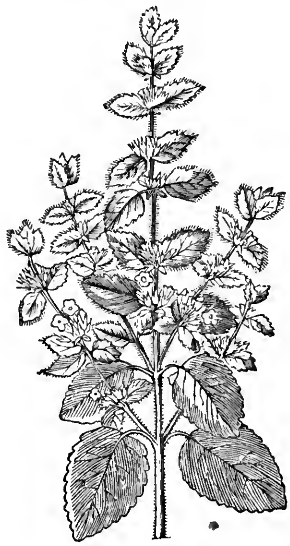

Fig 348. — BALM.
(*Melissa officinalis.*)

In the fresh state it has a fragrant odor, very similar to that of lemons, but is nearly inodorous when dried. The taste is somewhat austere, and slightly aromatic. The herb contains a minute proportion of a yellowish or reddish-yellow essential oil, which has its peculiar flavor in a very high degree. It contains also tannin, bitter extractive, and gum.

Melliferous, producing honey.

Melodeon. See HARMONIUM.

Melodrama, a play with songs, music, or pantomime.

Melon, a grateful and delicious fruit of several vines, of the gourd family. The principal is the musk-melon (*Cucumis melo.*) The varieties in cultivation are very numerous, some of them distinguished by a thick and warty rind, some by a rind cracked in a net-like manner, some by ribs and furrows, some by a perfectly smooth and thin rind; they differ also in the color of the *flesh* of the fruit, which is green, red, yellow, etc.; and in the size of the fruit, which varies from 3 or 4 inches to a foot or more in diameter. The *M.* is either eaten by itself, or with sugar, and sometimes with pepper or ginger. The *M.* can be grown in the open air in the S. and M. States. Its cultivation in hot-beds is extensively carried on in all parts of the U. States, but not generally with the care bestowed on it in Europe. The Water-*M.*, or Citrul, *Cucumis citrullus*, is highly esteemed and much cultivated in almost all warm countries. It is a native of the warm parts of the Old World. It has deeply lobed and gashed leaves, and a large round fruit, with smooth dark-green spotted rind, and pink or white flesh, less sweet than the *M.*, but much more juicy or watery, and therefore much prized in many warm countries, not merely as an article of food, but for quenching thirst and allaying fever.

Melt, to make or become liquid. — The soft roe of a fish. — The spleen of an animal.

Melton, a kind of broad and fine cloth, with unfinished face, and without raised nap, usually 56 to 58 inches in width.

Memel. See GERMANY (SEAPORTS).

Memoir, a statement.

Memorandum, a reminder; a note to refresh the memory.

Memorandum Check, a check on a bank given as a security for a loan, with the understanding that it will be presented at the bank only in case the drawer does not redeem his debt at the time fixed. If a *M. C.* is indorsed, it is valid like any other check in the hands of the indorsee.

Memorial, a statement of facts and petitions.

Memphis. See TENNESSEE.

Memphis and Charleston R.R. runs from Memphis, Tenn., to Stevenson, Ala., 272 m.; branches, 20 m.; total, 292 m. This Co., whose offices are in Memphis, was chartered in 1846, and the road was opened in 1858. On June 2, 1877, the line was leased to the East Tennessee, Virginia, and Georgia R.R. Co., but the lease may be terminated on 6 months' notice. The lessees operate the road for their own account, and must apply the net earnings, first to interest, and the balance, if there is any, to the lessors. Cap. stock, $5,312,725; funded debt, $4,220,000. Cost of construction and equipment, $8,640,953.

Memphis and Little Rock R.R. runs from Little Rock to Hopefield, Arkansas, 133 m. This Co., which is located at Little Rock, was chartered in 1853, and the whole line was opened in 1874. The line was sold in foreclosure in 1877, and was purchased, on account, of the bondholders. Under Acts of Congress of Feb. 3, 1853, and July 28, 1866, the Co. received land-grants, which are covered by the general mortgage. Cap. stock, $1,500,000; funded debt, $2,850,000.

Memphis, Paducah, and Northern R.R. runs from Paducah, Ky., to Trimble, Tenn., 78 m.; and from Memphis to Covington, Tenn., 37m.; total, 115 m. This Co., located at Paducah, whose name was then the Paducah and Memphis R.R. Co., was sold on foreclosure, purchased for the bondholders in 1877, and reorganized under its present name in 1878. Capital (cost of purchase), $105,000; funded debt, $1,951,000.

Menhaden, a North American fish of the Herring family, the *Alosa menhaden*, differing from the common herring in having a deep notch in the centre of the upper jaw. "It comes into Massachusetts Bay in May, and departs in November; great quantities are taken in nets around the outer islands of Boston harbor during the night; sometimes 100 barrels are taken at one haul, and such as are not ground up for bait are sold for food at about half a cent each; being rather oily, they are not very palatable, but make excellent manure. A single menhaden of common size is considered equal in richness to a shovelful of barnyard manure; in some parts of Cape Cod they are sold at $1 a thousand, and 2,500 are considered sufficient for an acre of land; the odor arising from their decomposing bodies is almost unendurable. They are found from the British Provinces to the coast of New Jersey, swimming in countless numbers near the surface, and attended by sharks, blue-fish, gulls, and other predaceous species. They are never found in fresh water. — Menhaden oil is of value, being used principally in leather-dressing, but also to some extent in rope-making and for painting. The scrap or refuse, after extracting the oil from the boiled fish, is used in the manufacture of fertilizers. The business of catching menhaden

for oil and guano has within 15 years assumed extensive proportions. It is carried on from Maine to New Jersey, and is especially prominent in the E portion of Long Island. They are caught chiefly in purse nets as far out as 30 m. from land, but also in shore seines and other nets. Those taken on the Maine coast yield more oil than those caught farther south. In 1873 there were 62 factories in operation on the coast of New York and New England, employing 383 sailing vessels and 20 steamers, with 2,306 men on shore and at sea; capital invested, $2,388,000; total catch, 1,193,100 barrels (250 fish to a barrel), yielding 2,214,800 gallons of oil, and 36,299 tons of guano; value of products, about $1,600,000." — *The American Cyclopædia.*

Menial, a hireling; a domestic servant.

Mensuration, the art or science which treats of the measurement of the surfaces, areas, and solidity of different figures or bodies.

Menuisier, a French joiner or cabinet-maker.

Mercantile, relating to trade.

Mercantile Agency, a name applied to various houses in New York, whose principal object is to supply, to annual subscribers, information respecting the character, capacity, and pecuniary condition of persons asking credit. It has been urged as an objection to the *M. A.* system that it is secret in its operations, and that it partakes of the nature of a system of espionage, seemingly at variance with that candor and love of open dealing so characteristic of our commercial usages; but after an experience which now extends to about forty years, it is generally acknowledged that the business of the principal agencies is conducted upon fair principles, and the valuable services that they have rendered to the domestic trade of the country, as a check upon our credit system, have decidedly gained for them the public favor and confidence.

The first *M. A* was established in 1841, in the city of New York, by Lewis Tappan. It increased rapidly, and soon assumed a permanent and recognized position among the mercantile institutions of the country. It is now — with slight adaptations to altered business necessities — conducted upon the original plan, and on the most honorable principles, by Messrs. Dunn, Barlow & Co, who have branches in all the principal cities of the U. States, Canada, Great Britain, and France. It is after investigating the business of that agency that Mr Freeman Hunt, who was fully conversant with the subject, published in "Hunt's Merchants' Magazine" a valuable article in defence of the *M.-A.* system which has preserved its actuality to this day, and from which the following extract is taken: "To carry out the credit system intelligently and safely, the creditor must be well acquainted with the debtor Confidence is the life of the system, and confidence can rest only on knowledge Before the establishment of this Agency our merchants were in the habit of getting such information of their customers as they could, by correspondence or otherwise Some of the larger houses, whose business would justify the expense, employed travelling agents. These they kept constantly out, in different parts of the country, looking after and reporting their debtors, and collecting debts The smaller houses were, of course, deficient in the knowledge so necessary to their success in business, while the larger ones purchased their information at too high a cost. The Agency obviates these difficulties — By an extensive and well-sustained system of correspondence, extending to every part of the U States and Canada, it obtains the requisite information respecting every trader in the country whose business leads him to contract debts away from home This information is copied in books prepared for the purpose, and held for the use of such merchants as pay for it and want it It is not made public. It is not communicated even to subscribers, except when the trader, by soliciting credit, renders inquiry into his circumstances necessary It is made known only to those with whom he proposes to trade. If he does not ask a credit at all, it remains on the record, unread and unseen, from year to year — It appears, then, that the object of the system is simply to furnish the merchant subscriber with such information as will enable him to judge whether or not, and to what extent, he should give credit to parties applying for it,— thereby rendering the credit system safe and profitable — That this is justifiable and right, no one who reflects for a moment will be disposed to deny The man who seeks to purchase goods on credit, or otherwise to contract a debt, virtually challenges investigation as to his responsibility. The city merchants are always ready to afford facilities to those who may wish to become their customers. They are anxious to sell their goods, and expect to sell the greater part of them on time; and only ask to know who and what the men are, whom they are called on to credit. What reasonable objection can such men make, when inquiry is made as to their property, character, and business qualifications? The banker will not discount a note unless he knows something of the party, or parties, whose names appear on it. And why should the merchant be expected to sell his goods to a man of whom he knows nothing? And how or where is he to obtain the necessary information? Certainly at the *home* of the trader. There, and there only, can he learn whether he owns property, and is a man of good character, whether he does a legitimate or a speculative business, and whether he is competent, steady, and attentive, or otherwise. — It is evident that information of this kind must be had, or the credit system greatly curtailed, and, at times, almost wholly abandoned. The man who gives his neighbor credit does so because he believes he knows him, and has confidence in his integrity and ability to pay. A stranger he will not credit until, by obtaining the necessary information as to his character, responsibility, etc., he has acquired a degree of confidence which is equivalent to a personal acquaintance. This confidence, and the information on which it is grounded, is the indispensable basis of credit. The buyer knows and feels this, as well as the seller. He does not presume to ask a credit, without showing some reasonable ground for it in his position or property He knows that the seller will investigate his statement. He cannot, he does not, object to his doing so. If his condition be a healthy one, he is glad to have him do so. It follows, therefore, that the obtaining of such information is justifiable and necessary. If the creditor may justly and honorably obtain it for himself, may he not properly employ an agent to do it for him? *Qui facit per alium facit per se.* And may not the merchants of any city, or section, combine to have it all done at a vast saving of time, labor, and expense, by one or more agents? — Having thus briefly stated the object, we proceed to glance at the operations of the Agency, merely premising that our statement and opinions are the result of careful inquiry and personal examination. And here the first thought that presents itself is this, — that the proprietors can have no possible motive for injuring or misrepresenting any man. Their true and only interest is, to get as near as possible to the truth in every report. The least deviation on either side from this standard may have, nay, *must* have, an unfavorable influence upon their own prosperity. If they report a man too favorably, and the subscriber, thus induced to trust him, loses his debt, they are blamed. If they report him too unfavorably, and the subscriber thereby loses a good paying customer, they are equally blamed In fact, the entire success of the system depends upon the general truthfulness and justice of their records,— upon having every report they give out verified by the results to which it leads. This, we are assured, the proprietors fully understand and act upon to the utmost of their ability, sparing no pains or expense to secure the greatest accuracy in every case. — Having thus the guarantee of the self-interest, as well as of the character of the proprietors, it would seem that the subscriber must have confidence in the Agency. There is, however, another matter of primary importance, — the reliability of the sources from which information is obtained. That information can easily be had, respecting any man, is granted. But, can the Agency procure and retain the services of men, as correspondents, whose character and standing in society would entitle them to confidence. The best proof which can be afforded of the possibility of procuring correspondents of the right sort is the general accuracy of the reports they furnish. If these, as a whole, are true and reliable, it follows that the parties furnishing them must be men of judgment, veracity, and honor, capable of forming an accurate estimate of their fellow-men; and not likely to report a man unfavorably from personal pique, or too favorably from personal friendship. The reports of the Agency being so far satisfactory and useful to the mercantile community as to induce a large and growing subscription to its terms, is proof enough that it has correspondents of this character in all parts of our Union and of Canada. We are informed that the number is but little less than two thousand. — We presume the proprietors do not pretend to infallibility; but we are satisfied that the records of the office are rarely inaccurate, and never seriously so. Indeed, the plan pursued insures accuracy; for they deal in facts, and not in opinions. For instance, — they record the amount of real estate held by the trader; its incumbrances, if any; whether or not he permits judgments to go against him; whether he speculates, and if so, to a dangerous extent, or otherwise; whether he is attentive to business, and is capable of managing it; whether he bears a good character for integrity in his dealings, and promptness in his payments, etc. These facts are made known to the merchant, who is then left to form his own opinion, not only as to the propriety of giving credit, but

as to the extent to which it should be given. — We think ourselves incapable of saying one word in favor of any system of *espionage;* and, did we believe this to be one, it should have our heartiest condemnation. That it is not, is made sufficiently clear by the nature of the information sought for. — The records of the county where the trader resides, which are always open to inspection, furnish an important part of this information. The rest is matter of common observation and remark among his neighbors. — Keeping in view the object of these agencies, we think their system of operations, as far as we have referred to them, admirably adapted for carrying out that object. The city merchant has furnished to him all the information he needs or desires at a much cheaper rate than he could procure it for himself, and with a promptness which it would be impossible for him to equal through any other channel. This information is revised and renewed twice a year, and as much oftener as, in the judgment of the creditors, the case demands. A continuous history of the customer is thus preserved, by which the creditor's knowledge of him is made to approximate, as nearly as possible, to a personal accquaintance. If the trader in Eastport, Toronto, Dunkirk, Milwaukee, Richmond, Raleigh, Galveston, or San Francisco meets with a heavy loss, by fire or otherwise, makes a splendid operation, has property left him, or his note protested, the fact is immediately communicated to all the associate offices, and by them to the creditors. It is not published to the world, but made known only to those who, by having made *special inquiry* for the party, are presumed to be interested in his success. — One other point in the operations, and one of considerable importance, remains to be noticed, and that is its effect upon the country trader. On this point we have expressed the opinion which is the result of deliberate examination, that the system is as useful to those who seek credit as to the city merchants who are called upon to give it. It is a well-known fact that, formerly, the trader was confined in his purchases to a few houses, where he might have formed an acquaintance. If wholly unacquainted, he was obliged to take letters from responsible parties at home, and was limited in his business relations to the few to whom those letters were addressed. Under the present arrangement the trader needs no letter of introduction. He is known to the whole list of the Agency's subscribers, or, if not known, becomes so as soon as he asks a credit. He has the range of all the entire market in the cities where these offices are established; the communication between them being such, that what is known to one is known to all. He need not even leave home to make his purchases. His order is as good as his presence, and will always be promptly met, to the extent of what his intelligent neighbors regard as safe and prudent. This surely is a great advantage, which the honest, capable, and trustworthy trader cannot fail to appreciate. — A second advantage, and by no means a light one, which the country trader derives from this system, is the protection it affords against the unhealthy and injurious competition of fraudulent or incompetent neighbors in the same business. There is no greater drawback to the success of an honest, industrious tradesman, in a small town or village, *than the irregular, shuffling transactions of a weak, lame, broken-winged, or wingless rival,* who does everything at hap-hazard, buying at any price, and selling at any sacrifice, merely to keep up a flow of business, out of which he may manage to live for the time being. There are many grades of such characters in the business world. Some of them are flagrantly dishonest, expecting and willing to fail now and then, and resolved at all events to have a living out of any whom they can surprise into trusting them. Some, on the other hand, are well-intentioned, but incompetent. Without knowing why, or how, they find themselves every now and then in failing circumstances. These are more to be respected than the other class, but scarcely more to be trusted. They are as much in the way of the capable, energetic, well-trained business-man's success as the other. They have no rules to go by; but provide, as they can, for each exigency as it arises. They never know what they are worth, or whether they are worth anything at all. When they open an account, or give a note, they never know whether they can pay it or not. They *hope* to pay it, and intend to *if they can.* The experience of every well-bred merchant and trader can furnish originals for the picture. Against the vexatious and ruinous competition of such men, the *M. A.* is designed and calculated to protect them. It would not *injure* the weak or the unfortunate, but would commend them to employments which they are capable of managing. Trade is a science, to which many, who would make excellent mechanics or agriculturists, are wholly incompetent. — A third advantage to the capable and enterprising trader is found in the fact that he is by this system brought very near to his creditor, — as it were, always under his eye, and will, consequently, be stimulated to greater watchfulness, care, and circumspection in his business. He will not be so readily tempted into rash speculations, or other irregular transactions which so often result in disaster and dishonor. It is no discredit, even to an honest man, to say that he is safer under the wholesome restraints and jealous vigilance of society than he would be without them. Many a man, with the most upright intentions and the most confident expectations of a favorable result, has been induced to invest a portion of his means, or, to speak more properly, of the means of his creditors, in some promising but unfortunate enterprise, which he would not have touched if those creditors had been near, and cognizant of the movement. Prudence is the better part, not only of valor, but of thrift; and prudence, like the other virtues, is all the better for being watched. — If among the class of traders who want more credit than they find themselves able to get, any one is still disposed to object, we take leave to ask on what principle he conducts his business as home? Does he trust anybody and everybody without asking a question? When a stranger comes into the neighborhood, does he open an account with him at once, and to an unlimited extent, without inquiring into his affairs? Does he think it mean or dishonorable to send to the place from which the stranger came, and ascertain how far he was regarded as worthy of credit *there?* Does he think the former neighbors of the new-comer mean or dishonorable, if they tell him frankly what they think, thereby securing him a good customer or saving him from a bad one? By no means. The principle is universal. It belongs to the retail credit business, as well as to the wholesale. It governs the trader selling his hundreds or thousands, as well as the importer selling his tens of thousands or millions. Confidence, as we have before said, is the life of credit, and knowledge is the life of confidence. Business cannot go on without it, except by dwindling down to a rigid cash or barter trade. — But it is not *trade* alone that acts upon principles, and uses these means of applying them. The whole business of banking, marine, fire, and life insurances, etc., is conducted in the same way. A man who would take out a policy on his life must undergo a rigid examination, and answer, in writing, a series of searching and difficult questions, an error, wilful or otherwise, in any one of which forfeits his policy. He must do more. He must find some personal acquaintance who shall confirm in writing the statements he has made. And then, the physician of the company must pass judgment upon the case. After the policy is delivered the company still keeps a watchful eye upon the insured; and in case of death institutes a rigid scrutiny, to ascertain, if possible, whether he had not knowingly the seeds of death in him at the time when the policy was issued. — The same is true with reference to the professions. The very trader who complains of *espionage* on the part of the *M. A.*, when it inquires into his ability and honesty in giving a note, does the same thing, not only when he takes a note from another, but when he sends that note to a lawyer for collection. He sends it only to one in whom he has confidence that he will pay over what he collects. If he does not know such a lawyer himself, he is careful to inquire till he finds one. The man who expects to be intrusted, to any extent, with the business or property of another without an inquiry being instituted into all those circumstances which have a bearing on his responsibility and trustworthiness, can have but little experience in the ways of the world. The man who *objects* to such investigation gives, in doing so, *prima facie* evidence that the result would be unfavorable to himself."

Mercantile Fire-Insurance Co., located in New York City, organized in 1850. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $36,832.19; premiums, $46,044.15. Premiums received since the organization of the Co., $1,796,551.04; losses paid, $881,170.20; cash dividends paid to stockholders, $522,000.

Mercantile Insurance Co., a fire and fire-marine insurance Co., located in Cleveland, O., organized in 1871. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $141,137.85; premiums, $114,816.61. Premiums received since the organization of the Co., $1,136,-162.94; losses paid, $692,659.02; cash dividends paid to stockholders, $175,000.

Mercantile Marine Insurance Co., a fire and fire-marine insurance Co., located in Boston, Mass., organized in 1823. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $400,000; net surplus, $196,262.60; premiums, $58,655.15. Premiums received since the organization of the Co., $4,837,-827.20; losses paid, $3,790,137.08; cash dividends paid to stockholders, $1,695,625.00.

Mercantile Paper, same as commercial paper.

Mercator's Chart, a chart or map which presents the surface of the earth projected on a plane, so that all the meridians and parallels are straight lines. It was invented by Gerard Mercator in the 16th century. This projection is universally adopted for nautical charts, by reason

of the facilities it affords in navigation, from the circumstance that the rhomb, or sailing course between two points, is represented by a straight line.

Mercer, a dealer in silks and cloths, laces and small-wares.

Mercerie, a branch of the French trade, partly corresponding to our notion, small-ware, and fancy-goods trades, and like them embracing an indefinite and almost endless variety of articles.

Merchandise, trade goods or wares; the stock dealt in, received, forwarded, or kept for sale. As used in section 2766 of the U. States Revised Statutes, the term includes goods, wares, and chattels of every description capable of being imported.

Merchant, one who buys and sells commodities in gross, or deals in exchange, or one who traffics in the way of commerce, either by importation or exportation. The word is, however, often affixed to special home-traders, as coal-merchant, wine-merchant, timber-merchant, etc. — In the U. States, however, with the exception of New York and some other large commercial cities, the term is loosely applied to all dealers in general merchandise, even to small retailers, who are termed *retail* merchants.

Merchantable. Same as marketable.

Merchant-Iron, bar-iron.

Merchant Law. See LAW MERCHANT.

Merchantman, a ship or vessel employed in the transportation of goods; a trading vessel, as distinguished from a ship of war.

Merchant-Marine, the collective name for all sailing and steam vessels registered and licensed by the government and engaged in commerce. The *M. M.* of the U. States is given in this work under SHIPPING.

Merchant-Service, the management and navigation of vessels carrying freight and passengers.

Merchants' Exchange. See EXCHANGE.

Merchant-Ship, a trading vessel; one carrying freight and passengers.

Merchants' Insurance Co., located in New York City, organized in 1850. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $159,060.30. Premiums received since the organization of the Co., $3,905,609; losses paid, $1,606,554; cash dividends paid to stockholders, $1,032,000.

Merchants' Insurance Co., a fire and fire marine insurance Co., located in Providence, R. I., organized in 1851. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $400,000; net surplus, 419,634; premiums, $321,341. Premiums received since the organization of the Co., $3,560,934.67; losses paid, $1,428,179; cash dividends paid to stockholders, $288,150.

Merchant-Tailor, a tailor who supplies cloths, etc., for garments; a name now assumed by many clothiers and outfitters.

Mercury, Quicksilver [Fr. *mercure, vif argent;* Ger. *Quicksilber;* It. *argento vivo;* Sp. *azogue*]. This metal was known in the remotest ages, and seems to have been employed by the ancients in gilding, and separating gold from other bodies, just as it is by the moderns. Its color is white, and similar to that of silver; hence the names of *hydrargyrum, argentum vivum, quicksilver*, by which it has been known in all ages. It has no taste or smell. It possesses a good deal of brilliancy, and when its surface is not tarnished it makes a very good mirror. Sp. gr., 13.568. It differs from all other metals in being always fluid, unless when subject to a degree of cold equal to —39°, when it becomes solid. *M.* is found in various parts of the world. Among the principal mines are those of Almaden, near Cordova, in Spain; Idria, in Carniola; Wolfstein and Morsfield, in the Palatinate; Guancavelica, in Peru; California, in the U. States; etc.

Most of the ores of *M.* are readily distinguished from those of any other metal: in the first variety, globules of the metal are seen attached to or just starting on the surface, which is at once a sufficient criterion, *M.* being unlike every other metal; in the second, by the fine white color, and the action of the blowpipe, which sublimes the *M* and leaves the silver behind: the third by its beautiful deep red tint, varying from cochineal to scarlet red, excepting in those termed hepatic cinnabars, which are generally of a lead gray; the fourth, by its gray color, its partial solubility in water, and its complete volatilization by heat, emitting at the same time an arsenical odor. Before the blowpipe these varieties burn with a blue flame and sulphurous odor, leaving more or less residue behind them, and which may consist of earthy matter, as silex and alumina, together with the oxides of iron and copper.— *M.* is often adulterated by the admixture of lead, bismuth, zinc, and tin. When the metal quickly loses its lustre, is covered with a film, or is less fluid and mobile than usual, or does not readily divide into round globules, there is reason to suspect its purity. There are two sulphides of *M.*; the black or *ethiops mineral*, and the red or *cinnabar* When *M.* and sulphur are triturated together in a mortar, the former gradually disappears, and the whole assumes the form of a black powder, denominated *ethiops mineral*. If this powder be heated red-hot, it sublimes; and on a proper vessel being placed to receive it, a cake is obtained, of a fine red color, which is called cinnabar. This cake, when reduced to powder, is well known in commerce by the name of *vermilion*. Calomel, or protochloride of *M.*, is the most useful of all the preparations obtained from it. It is in the form of a dull white, semi-transparent mass, having a sp. gr. of 7.176. It is more generally employed, and with better effect, than almost any other remedy in the whole range of Materia Medica. Besides its uses in medicine, *M.* is extensively employed in the amalgamation of the noble metals, in water-gilding, the making of vermilion, the silvering of looking-glasses, the making of barometers and thermometers, etc. — *M.* is found native in globules scattered through masses of rocks or ore, and also in the form of silver amalgam, but chiefly as a sulphide of *M.*, or cinnabar. Quicksilver was formerly extensively imported from Almaden, in Spain, but the U. States are now fully supplied by the California mines, whose products are besides largely exported. The deposits of New Almaden, 12 m. from San José, in Santa Clara Co., occur in the Coast Range, in a belt of altered cretaceous slates, between beds of serpentine on either side; the average yield of the ore is about 7.50 per cent quicksilver. Other mines occur in the same county, and in Fresno Co., several of which are worked. Pure cinnabar contains 13.79 of sulphur to 86.21 of quicksilver. The general average of the ores extracted is, however, less than 10 per cent of quicksilver; in the majority of deposits in California, not over 2 per cent. Even much poorer ore than this is worked in other parts of the world. The exports of quicksilver for the year 1879 amounted to 3,624,827 lbs., valued at $1,418,333; of which Hong-Kong received 2,509,150 lbs, valued at $975,637; and Mexico 865,021 lbs., valued at $344,000. *Imp.* duty, 15 per cent; mercurial preparations, 20 per cent.

Meriden Fire-Insurance Co., located in Meriden, Conn., organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $300,000; net surplus, $12,517.30; premiums received since the organization of the Co., $1,285,070.56; losses paid, $741,378.27; cash dividends paid to stockholders, $133,000.

Meridian, in geography, a great circle supposed to be drawn through any part of the surface of the earth and the two poles, and to which the sun is always perpendicular at noon. In astronomy, this circle is supposed to be in the heavens, and exactly perpendicular to the terrestrial one.— *Meridional Distance*, in navigation, is the same with departure, or easting and westing, being the difference of longitude between the *M.* under which the ship now is, and any other *M.* which she was under before. Meridional parts, miles, or minutes, in navigation, are the parts by which the *M.* in a Mercator's chart increase as the parallels of latitude decrease. *First Meridian*, the *M.* from which longitudes are reckoned. The choice of the first *M.* is entirely arbitrary; and most nations reckon the longitudes from their capital, or the *M.* passing

through their principal observatories. Thus in English works the longitude is reckoned from Greenwich; in French, from Paris; in Russian, from St. Petersburg; in the U. States, from Washington (and very frequently from Greenwich); etc. In this work the longitudes are measured from the *M.* of Greenwich.—*Meridian Line.* A line traced on the surface of the earth, coinciding with the intersection of the *M.* of the place with the sensible horizon.

Merino, a fine-woolled sheep (see SHEEP). A fine woollen goods for ladies' dresses, all wool, and twilled on both sides. It is principally made in France from the wool of the merino sheep.

Meshes, the interstices or open spaces between the lines of a net.

Meslin, Meteil, wheat and rye grown together for home consumption, a very common crop in France.

Mesquite, a French name for American oak.—A kind of gum. See MEZQUITE.

Mess, a dish; a meal.—A number of men who take their meals together.

Message, an errand; a telegram or despatch.

Messenger, an office-servant; the bearer of a message; a despatch-carrier in the employ of the foreign office; a rope used for heaving in a cable by the capstan.

Messine. See SICILY.

Mess-Kit, that portion of camp equipage which consists of cooking utensils.

Mestizo Wool, a wool grown in South America, from merino sheep crossed with the coarser-woolled kinds, whence the name, signifying *mixed*. The fibre of much of it is extremely fine, but it is so much entangled with the burrs of a plant common on the pampas, as to materially deteriorate its commercial value. The importations of this wool from Buenos Ayres, when washed, only show about 25 or 30 per cent of clean wool.—*T. McElrath.*

Mestoup, a name in the silk-trade for a package.

Met, MET JANGREE, a species of fuller's-earth found in Sinde, used for scouring the hair, and for cleansing calico cloths preparatory to dyeing.

Metage, the charge made for measuring goods in bulk from a vessel.

Metal, one of a class of solid (with the single exception of quicksilver, which is fluid, and used, on that account, to be called semi-metal), opaque, heavy bodies, which melt at various degrees of temperature, and recover their previous solidity when it is reduced; when cut or fractured they exhibit a brilliant or lustrous appearance, and possess more or less malleability, tenacity, etc. The really valuable *M.*, comprising gold, silver, quicksilver, copper, lead, iron, and tin, were all known to the ancients, and were as much esteemed by them as by the moderns. They are sometimes found native, but far more generally in the shape of ores intermixed with other bodies. And their separation from the latter, and manufacture into useful and ornamental articles, is one of the greatest achievements of human industry, and has contributed more, perhaps, than anything else to accelerate the progress of civilization. At this moment the smelting, refining, and working of *M.* forms one of the most important, if it be not the most important, industrial pursuit carried on in this country.

M. differ greatly in *density*, varying from platinum, which has a sp. gr. of 21.5 (21.5 times that of water), down to lithium, which is only 0.593 (little more than half the weight of water). The eight best-known *M.* stand to each other in this respect as follows: Gold, 19.3; mercury, 13.6; lead, 11.4; silver, 10.5; copper, 8.9; iron, 7.8; tin, 7.3; and zinc, 7.1. In *hardness* the *M.* vary from titanium, which can hardly be scratched by anything, to potassium and sodium, which are as soft as wax at ordinary temperatures; while mercury is a liquid. In *malleability* they range from gold, as the most malleable, to frozen mercury, which is excessively brittle. In *ductility* the range is from gold to cadmium; this property (admitting of the metal being drawn out into wire) not being exactly parallel with malleability (facility of being beaten into thin leaves). In *tenacity* they vary from iron, down through copper, silver, gold, zinc, and tin, to lead; while many of the rarer *M.* are too brittle to exhibit tenacity at all. In *heat-conducting* power the more useful *M.* range from gold to lead, iron occupying a medium position: this property has much to do with the selection of different kinds of *M.* for different purposes. In the *capacity* for heat (a different thing from the *conduction*) the range is from gold, at one extreme to tungsten at another. The *expansibility*, on being raised from 32° F. to 212°, is greatest in zinc, medium in gold, and least in platinum. In *fusibility* the range is from rubidium, which melts below the heat of boiling water, to platinum and its companion *M.*, which can hardly be melted at all. In *volatility*, or the comparative readiness with which they go off in vapor, they range from mercury, which begins to volatilize even at zero, to platinum, which can only be volatilized by electric action. Taking *M.* as a class, and setting aside individual differences, they all have metallic lustre, and they are all good conductors of electricity and of heat. It is difficult to name any other property which they have in common, except that they are all (apart from the alloys which they form one with another) simple substances. It should be said, also, that although conductors of electricity when in the solid state, they are insulators when vaporized. There have been about fifty *M.* discovered, which may be classified in various ways according to their chief properties. So far as concerns the requirements of the present work, the reader will find notices of all the *M.* of any importance in industry under their respective names.

Imp. duty: unmanufactured *M.*, n. o. p. f., 20 per cent.

Metal-Broker, a dealer in metals.

Metallic, made of metal.

Metallic Currency, the coins forming the circulating medium of a country.

Metallic Standard. See STANDARD.

Metalling, an engineering name for stone and other material applied to give firmness and solidity to railways and common roads.

Metalliques, a kind of Austrian stock, so called because the interest is paid in the precious metals, and not, like the interest of other stocks, in paper money. The name was afterward used in Russia and other countries for stocks of a similar kind.

Metallography, a method of transferring to plates of metal devices engraved on wood blocks.

The block is wetted with an acid or saline solution, the nature of which varies with the kind of metallic surface to which the transfer is to be made. The block is printed on the plate; a solid precipitate is thrown down from the solution by chemical action, and this precipitate holds sufficiently on the surface of the metal to form a kind of picture. The process is ingenious, but has not yet come much into use.

Metallurgy, the collective name given to those important operations whereby metals are separated from the various substances and impurities which accompany them in the ores. The operations form two groups,—a *mechanical* separation of the stony accompaniments, and a *chemical* separation of those which are metallic. The stony substances are often classed together under the name of *gangue*, and their removal is described under ORE-DRESSING. The final separation of the metals from the remaining impurities is the object of *smelting*, for which see the names of the chief metals themselves,—COPPER, IRON, LEAD, TIN, ZINC, etc.

Metal-Perforator, a workman who bores or makes holes in metals.

Metal-Planer, a smoother; a polisher of metallic substances.

Metal-Refiner, a smelter of ores, one who separates the dross from copper, lead, and other ores.

Metal-sash-Maker, a constructor of frames of metal for holding panes of glass.

Metal-Turner, a turner and driller of metals.

Métaux, the French plural of métal.

Meteorograph. See RECORDING INSTRUMENTS.

Meter, a measurer out of fruit, corn, etc. See also GAS-METER. — The English name for METRE (which see).

Method, a plan or system; order or classification.

Methylated Spirit, spirit of wine of 5½ per cent over-proof, mixed with not less than one ninth part of its bulk measure of wood naphtha, or methylic alcohol, for use in manufactures, and to prevent its consumption as a beverage.

Mètre, the unity of French long measures, = 39.3710 inches.

Metric System, a system of weights and measures adopted first in France, and now slowly superseding the systems in use in other countries. By the act of Congress passed July 28, 1866, it is made lawful throughout the U. States to employ the weights and measures of this system; and the subjoined tables form part of the second section of the act referred to, and are to be "recognized in the construction of contracts, and in all legal proceedings, as establishing, in terms of the weights and measures now in use in the U. States, the equivalents of the weights and measures expressed therein in terms of the metric system; and said tables may be lawfully used for computing, determining, and expressing in customary weights and measures, the weights and measures of the metric system." — The two most important points of this system are: 1, that it is a *decimal system;* and 2, that the units of length, superficies, solidity, and weight are all correlated, two data only being used, the *mètre* and the weight of a cube of water, the side of which is the hundredth part of a mètre. Two important principles form the basis of the metric system: 1. That the unit of linear measure, applied to matter, in its three forms of extension — viz., length, breadth, and thickness — should be the standard of all measures of length, surface, and solidity. 2. That the cubic contents of the linear measure, in distilled water, at a temperature of great contraction, should furnish at once the standard weight and measure of capacity. Thus: 1. The *unit of length* was the *mètre,* as we have seen, the 10,000,000th part of a quadrant of the earth's surface. From this we derive: 2. The *unit of superficies,* — the *are,* a square décamètre. 3. The *unit of capacity,* — the *litre,* a cubic décimètre. 4. The *unit of weight* — the gramme, the weight of a cubic décimètre of water. These four units are subdivided into tenth, hundredth, and thousandth parts, which are denominated by the syllables derived from the Latin *deci, centi,* and *milli;* the multiples are similarly by tens, hundreds, thousands, tens of thousands, etc., distinguished by the prefixes, borrowed from the Greek, of *deca, hecto, kilo,* and *myria.* The subjoined scale shows the whole metric system at a glance.

Measures of				Proportions.
Length.	Surface.	Capacity	Weight.	
Millimètre			Milligramme	1,000th part.
Centimètre	Centiare	Centilitre	Centigramme	100th part.
Décimètre	*(Not used)*	Décilitre	Décigramme	10th part.
Métre	Are	Litre	Gramme	One.
Décamètre	Decare	Décalitre	Decagramme	10 times.
Hectomètre	Hectare	Hectolitre	Hectogramme	100 times.
Kilomètre		Kilolitre	Kilogramme	1,000 times.
Myriamètre			Myriagramme	10,000 times.
			Quintal	100,000 times.
			Ton	1,000,000 times.

The whole of the multiples and subdivisions of the metric system are decimal, and the reduction from one denomination to the other is performed by multiplying by 10 or its multiples, or dividing by them. There is no necessity to alter the figures, but merely to read them differently by placing the decimal point so many places to the right or left of its place in any given number, according to the terms of the required denomination. For example, if we desire to represent 52749. mètres in décimètres, we write 527490.; if we wish to reduce it to centimètres, we write 5274900. For the higher denominations we write 5274.9 décamètres, or 527.49 hectomètres, etc. For measure of capacity and weight the reduction is carried on in precisely the same manner as in that of the metre and its multiples. — No system of metrology hitherto invented can be compared with this of the French in a scientific point of view, and also in convenience for the purposes of commerce.

MEASURES OF LENGTH.

Metric denominations and values.		*Equivalents in denominations in use.*
Myriamètre	10,000 mètres	6.2137 miles
Kilomètre	1,000 mètres	0.6213 miles, or 3,280 feet and 10 inches.
Hectomètre	100 mètres	328 feet and 1 inch.
Dècamètre	10 mètres	393.7 inches.
Mètre	1 mètre	39.37 inches.
Décimètre	$\frac{1}{10}$ of a mètre	3.937 inches.
Centimètre	$\frac{1}{100}$ of a mètre	0.3937 inches.
Millimètre	$\frac{1}{1000}$ of a mètre	0.0394 inches.

MEASURES OF SURFACE.

Hectare	10,000 square mètres	2,471 acres
Are	100 square mètres	119.6 square yards.
Centare	1 square mètre	1,550 square inches.

MEASURES OF CAPACITY.

Names.	*Number of Litres.*	*Cubic Measure.*	*Dry Measure.*	*Liquid or Wine Measure*
Kilolitre or stere	1000	1 cubic mètre	1.308 cubic yards	264.17 gallons.
Hectolitre	100	$\frac{1}{10}$ of a cubic mètre	2 bushels and 3.35 pecks	26.417 gallons
D calitre	10	10 cubic d cimètres	9.08 quarts	2.6417 gallons.
Litre	1	1 cubic d cimètre	0.908 quarts	1.0567 quarts.
Décilitre	$\frac{1}{10}$	$\frac{1}{10}$ of a cubic décimètre	6.1022 cubic inches	0 845 gills.
Centilitre	$\frac{1}{100}$	10 cubic centimètres	0.6102 cubic inches	0 338 fluid ounces.
Millilitre	$\frac{1}{1000}$	1 cubic centimètre	0.061 cubic inches	0.27 fluid drams.

WEIGHTS.

Names.	*Number of grammes.*	*Weight of what quantity of water at maximum density.*	*Avoirdupois.*
Millier, or Tonneau	1,000,000	1 cubic mètre	2204 6 lbs.
Quintal	100,000	1 hectolitre	220.46 lbs.
Myriagramme	10,000	10 litres	22.046 lbs.
Kilogramme, or Kilo	1,000	1 litre	2.2046 lbs.
Hectogramme	100	1 décilitre	3.5274 ounces.
Décagramme	10	10 cubic centimètres	0.3527 ounces.
Gramme	1	1 cubic centimètre	15.432 grains
Décigramme	$\frac{1}{10}$	$\frac{1}{10}$ cubic centimètre	1.5432 grains.
Centigramme	$\frac{1}{100}$	10 cubic millimètres	0 1543 grains.
Milligramme	$\frac{1}{1000}$	1 cubic millimètre	0.0154 grains.

Metrograph, a controller of the speed of railway trains; this apparatus indicates at every moment and every mile the speed of the train, and the hour of arrival and departure at each station.

Metronome, an instrument for beating and dividing the time in music.

Metropolitan Life-Insurance Co., located in New York City, organized in 1867. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; assets, $2,022,482.45; liabilities, $1,656,385.61; gross surplus, $366,096.84. Policies in force, 7,680, amounting to $11,150,349; premiums, $432,559.82.

Meubles [Fr.], furniture.

Meursault. See BURGUNDY WINES.

Mexico (Estados Unidos de Méjico), a federal republic occupying the S. W. part of North America, between lat. 15° and 32° 42′ N., lon. 86° 34′ and 117° 7″ W. It is bound N. and N. E. by the U. States, E. by the Gulf of Mexico and the Caribbean Sea; S. E. by Honduras; S. by Guatemala; and W. by the Pacific Ocean. Its extreme length from N. W. to S. E. is about 760 m., its greatest breadth about 550 m. At the Isthmus of Tehuantepec its minimum width is 140 m. The following table, drawn up after the report published in the "Diario Oficial" of Mexico, June 7, 1875, gives the area and population of the 27 States composing the republic, with addition of the territory of Lower California, and the Federal district of Mexico, seat of the central government: —

State.	Area in sq. m.	Population.	Capitals.
States: —Aguas Calientes.	2,895	89,715	Aguas Calientes.
Campeachy	25,832	80,366	Campeachy.
Chiapas	16,048	193,987	Chiapas.
Chihuahua	83,746	180,668	Chihuahua.
Coahuila	50,890	98,327	Saltillo
Colima	3,743	65,827	Colima.
Durango	42,510	185,077	Durango.
Guanajuato	11,411	900,000	Guanajuato.
Guerrero	24,550	320,069	Guerrero.
Hidalgo	8,163	404,207	Pachuca.
Jalisco	39,168	966,689	Guadalajara.
Mexico	7,838	663,557	Toluca.
Michoacan	25,689	618,240	Morelia.
Morelos	1,776	150,384	Cuernavaca.
Nuevo-Leon	23,635	178,872	Monterey.
Oajaca	33,591	648,779	Oajaca.
Puebla	12,021	697,788	Puebla.
Queretaro	3,207	153,286	Queretaro
San Luis Potosi	27,500	460 322	San Luis Potosi.
Sinaloa	36,198	168,031	Culiacan.
Sonora	79,021	109,388	Ures.
Tabasco	11,851	83,707	San Juan Bautista.
Tamaulipas	30,225	140,000	Ciudad Victoria.
Tlaxcala	1,620	121,663	Tlaxcala.
Vera Cruz	26,232	504,950	Vera Cruz.
Yucatan	29,567	422,365	Merida.
Zacatecas	22,998	397,945	Zacatecas.
Territory: — Lower California	61,562	23,195	La Paz.
Federal District of Mexico	461	315,996	Mexico.
Total	743,948	9,343,470	

The present constitution of *M.* bears date Feb. 5, 1857. By the terms of it *M.* is declared a federative republic, divided into States, — 19 at the outset, each of which is permitted to manage its own local affairs, while the whole are bound together in one body politic by fundamental and constitutional laws. The powers of the supreme government are divided into three branches, — the legislative, executive, and judiciary. The legislative power is vested in a congress consisting of a house of representatives and a senate, and the executive in a president. Representatives, elected by each State, at the rate of one member for 80,000 inhabitants, hold their places for two years. The senate consists of two members for each State, who are elected by a plurality of votes in the State Congress. The president and vice-president are elected by the Congress of the States, and hold office for 4 years. Congress has to meet annually, from Jan. 1 to April 15, and a council of government, consisting of the vice-president and half the senate, sits during the recesses. The administration is carried on, under the direction of the president, by a council of 6 ministers, heads of the departments of Justice, Finance, the Interior, Army and Navy, Foreign Affairs, and Public Works. — *M.* has 10 cities with a pop. exceeding 20,000, in 5 of which it is above 50,000. *Mexico*, the capital of the federation and the oldest city of America, is situated on a plain surrounded by mountains, and 7,602 feet above the level of the sea, in lat. 19° 27′ 5″ N., lon. 99° 5′ W. It is laid out in parallel lines, with intersecting streets at right angles, and has many truly magnificent buildings, vast in dimensions and faultless in architectural beauty. The city has many scientific and philosophical institutions, and municipal and national establishments, giving to it a very stately appearance; while the magnificent scenery that surrounds it adds tenfold to the charm and beauty of the picture. The climate is mild, equable, and very salubrious; the mean annual temperature is 70°. The principal occupations of the inhabitants are agriculture, the manufacture of paper, earthenware, cotton, woollen, and silk fabrics, the preparation of tobacco, and the commerce of importation. Pop. 250,000.

About one half of the surface of *M.* is situated within the tropics, while the rest belongs to the temperate zone, but of the former more than three fifths have a mild atmosphere, as nearly the whole interior is composed of an immense table-land of the mean height of 7,000 feet, continuous with the Andes of S. America, and running from 18° to 40° N. lat. In the course of this tract, however, detached mountains occur which rise into the region of perpetual snow. The table-land gradually declines towards the temperate zone; but the descent towards the coasts, especially the E. coast, is by a graduated series of terraces, which produce an extraordinary diversity of vegetation, and at the same time oppose great difficulties to the communication between the maritime districts and the interior. In the equinoctial region there are only two seasons, — the wet, from June or July to September or October, and the dry, which lasts eight months: in this district the different climates rise as it were one above another from the shore, where the mean temperature is about 78° F., to the central plains, where it is about 62°. The coast is humid and unhealthy for strangers, but the table-land is remarkable for its salubrity; most of the population of the country being concentrated upon the latter. The summit of the table-land is almost destitute of vegetation, owing to the absence of

moisture; but muriate of soda and other saline substances exist in great abundance. The remaining districts are in general productive. Maize is the chief object of culture; besides which, the banana, manioc, the cereal grains, rice, and the potato form the common food of the people. The Maguey plant, both in its natural state as *pulque*, and as the distilled liquor made from it, *mescal*, is an important item in the economy of considerable territories, but of no consideration in commerce. The pith of some varieties of the plant, baked like a potato, is, in many places, the food for nearly the year round of the half-wild tribes of the *sierras;* and the spirituous extract is the inebriating draught that keeps a large portion of the population about the cities and towns where it can be raised or bought in a state of wretchedness and physical destitution. The Mexican wheat is of the finest quality, and would form a staple export, but for the difficulty of transporting it to the seacoast. The narrow insalubrious plain along the coast, called the *tierra caliente*, or hot country, is remarkable for its luxuriant vegetation. The chief productions are the sugar-cane, cotton, cacao, indigo, and tobacco. The coffee of Colima is said to be equal in quality to the finest Mocha, and that of Vera Cruz is also held in great estimation. The tobaccos of Tabasco and Vera Cruz are quite equal to the finest of Cuba. At Oajaca the cacao yields three crops yearly. The southern part of the country, forming the isthmus, is celebrated for the variety and importance of its woods and medicinal plants, including logwood, caoutchouc, vanilla, jalap, and storax, besides the tree which nourishes the cochineal insect. Vast herds of horses, mules, and horned cattle cover the plains of the northern States.

The mines of Mexico, however, constitute the chief source of its wealth, particularly those of silver, which indeed are by far the most valuable in the world. Gold is obtained, but in comparatively small quantities. Copper, tin, iron, lead, and mercury are also to be found. The gold is procured chiefly from river deposits by washing, particularly in the province of Sonora; the veins of this metal are most common in Oajaca. The silver is mostly procured from veins. The quantity of silver annually extracted is estimated at 500 tons, and that of gold at a ton and a half. Almost one half of the total yield is derived from the three great mining districts of Guanajuato, Zacatecas, and Catorce. The whole of the gold and silver extracted from the mines of *M.* up to 1870 is estimated at $4,200,000,000. The State of Sinaloa is said to be literally covered with silver-mines, the foreign property in which is distributed as follows: American, $2,000,000; Spanish, $1,450,000; English, $250,000; and German, $50,000. There are in Oajaca about 90 silver and 40 gold mines; in Sonora, 147, chiefly yielding gold, besides a much larger number in which, although very productive, the works are suspended. The mines are public property, and any one can, by right of discovery, denounce or record a mine, and obtain authority to work a certain number of varas free of tribute.

The principal products of Mexican industry are brandy, and sugar made from cane, mescal, made from the juice of the maguey, oil, wine, and brandy made from grapes, earthen and glass wares, paper, and spun and woven cotton, silk, and woollen. Sugar is made in mills on all the estates where the cane is cultivated, and which are found chiefly in the States of Vera Cruz, Tabasco, Yucatan, Mexico, Guerrero, Michoacan, and Guadalajara; and brandy by stills in most of them. For the making of oil there are already in the capital above 50 mills, besides those in Tacubaya, Toluca, and Puebla. Not only is oil made in them from olives, which nearly supplies the consumption, but from ajonjote, linseed, rape-seed, colwort, higuerola, almonds, cacahuate, small nuts, and finally from calves' and pigs' feet, etc., to oil wheels and machinery. With respect to grape-wine and brandy, although there were vineyards in several States, they are manufactured only in those of Guanajuato, Coahuila, Lower California, Sonora, and Chihuahua, from the last of which are annually made more than 600 barrels of brandy, 300 of wine, and 200 tierces of raisins. Beer and pale ale of excellent quality are made in the capital. For the manufacture of earthen vessels of all kinds there are establishments in the republic, where they are made with much skill, the best in Mexico, Guanajuato, and Guadalajara. In fine pottery, great improvements have been made in Puebla, where the business has been carried on from very remote times, in Salamanca, in the State of Guanajuato, and in the capital, where there is a manufactory excelling all the rest. There are several establishments for plain glass in the capital, and the States of Mexico and Puebla, the product of which exceeds the consumption. There are about ten paper-mills in the Federal District, and the States of Mexico, Puebla, and Jalisco, which not only supply the demand for the press, but for other purposes, particularly writing-paper equal to that of other countries. The scarcity of linen rags requires most of the paper to be made of cotton, though some is made of linen, and also of the filaments of the maguey. Although many hand-wheel looms are used in making cotton fabrics, as rebozos, mantas, and other ordinary articles, there are above 80 large establishments moved by machinery, in the Federal District, and the States of Coahuila, Durango, Jalisco, Puebla, Mexico, Queretaro, and Vera Cruz. Although some pretty fine linens are made in them, they are but few, the chief part being hilazas and mantas. The manufacture of rebozos in the city of Zamora, in the State of Morelos, is worthy of particular notice. For woollen fabrics, besides the numerous shops in which are manufactured ordinary cloths and various common articles, there are seen large establishments in the district and the States of Mexico, Queretaro, Zacatecas, and the territory of Tlaxcala, in which are made cloths, cassimeres, carpets, baize, etc., which compete with those imported, both in quality and in price. In spinning and winding silk, more than 60 hand and steam machines are in the capital, Puebla, and Guadalajara, and the products are preferred to the foreign The only woven silks yet made are some rebozos and bands. All kinds of fancy trimmings are made in *M.*, as buttons, cords, braids, and many ornaments of cotton, wool, and silk. Gold and silver thread of all kinds are made, and bugles, spangles, galloon, cords and belts of silver and gold, and bells of silver and copper. Oil-cloths are made of qualities and patterns equal to foreign. Many other minor articles are also manufactured to a considerable amount annually.

Foreign Commerce. The total imports of *M.* for the year 1877 were of the value of $29,678,000, and the value of the exports $26,711,000; but systematic smuggling is everywhere so prevalent that the official figures may be safely doubled for the imports, and for the exports of bullion. The chief article of export was silver of the estimated value of $15,000,000, the remainder comprising copper, ores, cochineal, indigo, and other dyestuffs, mahogany and other woods, sizal hemp, hides, etc. The staple imports are cotton and linen goods, wrought iron, machinery, and provisions. More than two thirds of the total trade of *M.* is carried on with the United States, but almost half of the imports come from Great Britain. The remainder is principally with France, Germany, Spain, Cuba, and China.

The commerce of *M.* with the U. States for the fifteen years from 1865 to 1879 is shown in the following statement: —

Year Ended June 30.	Imports from the U.S.		Exports to the United States.	Total Imports and Exports.
	Domestic.	Foreign.		
1865......	$14,484,213	$2,530,867	$7,354,173	$24,369,253
1866......	3,716,599	871,619	4,155,603	8,743,821
1867......	4,862,066	590,182	3,920,974	9,373,222
1868......	5,061,344	1,392,919	6,115.922	12,570,185
1869......	3,837,699	1,047.408	7,232 006	12,117,113
1870......	4,556,441	1.318.955	13,099,031	18,974,427
1871......	5,082,533	2,568,080	17,511,163	25,161,776
1872......	3,445.658	2,132,931	8,507,124	14,085,713
1873......	4,084,816	2,345,347	16,430,225	22,860,388
1874......	4,073,679	1,930,691	13,239,905	19,244.275
1875......	3,895,792	1,874,991	11,634.983	17.405,766
1876......	4,706,778	1,501,394	12,505,753	18,713,925
1877......	4,509,041	1,389,692	15.444.583	21,343,316
1878......	5,843,609	1,649,275	13,645.648	21,138,532
1879......	5,405.420	1,355,864	14,047,819	20,809,103

The value of the principal articles imported from and exported to the U. States during the year 1879 was as follows, — *Imports:* sheep, $103,789; beer in bottles, $59.524; books, $11,266; Indian corn, $95,802; wheat flour, $124,787; candles, etc., $45,529; carriages, $20,727; clocks, $14,150; cotton goods, $1,777,895; drugs, etc., $125,893; fancy articles, $39,621; glass, $47,831; hats, $23,326; india-rubber goods, $16,584; machinery, etc., $493,296; edge-tools, $77,355; fire-arms, $123,673; lamps, $11,358; boots and shoes, $58,500; mineral oil, $152,438; gunpowder, $43,742; paper and stationery, $73,454; printing-presses, $22,884; butter, $15,891; lard, $102,052; quicksilver, 344,006; sewing-machines, $158,124; soap, $30,182; starch, $12,960; sugar (refined), $33,774; tobacco (leaf), $159,483; furniture, $62,858. — *Exports:* dyes, etc., $140,758; cochineal, $41,931; coffee (8,307,040 lbs.), $1,371,979; dye-woods in sticks, $96,877; gold bullion, $305,125; silver bullion, $8,249.473; gums, $16,416; hides and skins, $1,675,777; indigo, $20,552; lumber, $224,925; living animals, $132,873; Indian corn, $33,497; fruits, $51,149; hemp (raw), $44,651; jute (raw), $930,396; sugar (brown), $76 359; wool, $66,300.

Finances. The public revenue of *M.* is derived to the extent of more than two thirds from customs duties, laid both on exports and imports, while nearly one half of the total expenditure is for the maintenance of the army. The finances of the state have been for many years in great disorder, the expenditure exceeding constantly the revenue. The following statement represents the accounts of revenue and expenditure for the year 1876: —

Sources of Revenue.

Customs and harbor duties......................	$11,567,582
Taxes..	2.805,691
Stamps	2,531,220
Sale of national lands.........................	362,565
Post-offices and mint..........................	926,154
Miscellaneous receipts.........................	513.825
	$18,707,037

Branches of Expenditure.

Congress and executive power	$1,107,782
Supreme Court of Justice	315,310
Ministry of the Interior	1,997,345
Ministry of Finance	4,219,363
Ministry of War	10,691,967
Ministry of Foreign Affairs	208,760
Justice and education	912,395
Public Works	5,496,853
	$24,949,775

According to these accounts, the financial year 1876 showed a deficit of $6,242,738. The deficits of former years varied from $5,500,000 to $8,000,000. — The public debt of *M.*, both internal and external, was estimated, in 1876, at $395,500,000. But no official returns regarding it have been published since the reign of the Emperor Maximilian I., in 1865, when the total debt was stated to be $317,357,250. In the subjoined statement an abstract is given of these returns showing the state of the Mexican debt on August 1, 1865: —

Old English three per cent Loan, as per settlement of 1851	$51,208,250
Three per cent Stock, created 1864, for settlement of overdue coupons of old loan	23,324,000
Six per cent Anglo-French Loan of 1864	61,825,000
Six per cent Lottery Loan of 1865	50,000,000
Six per cent Internal Mexican Debt, circa	35,000,000
Admitted Claims of Foreigners bearing interest at 6 per cent	30,000,000
Amount due to French Government for war expenses at 31st March, 1865	65,000,000
Total	$317,357,250

The actual government of the republic does not recognize any portion of the above liabilities, except the six per cent Internal Mexican Debt, the interest of which has not been paid for a great number of years. — The chief financial institution is the Bank of London, Mexico, and South America, established in the capital, where there are also numerous private bankers, a government pawn-office, and 18 lotteries, with an aggregate risk capital of about $2,500,000, and paying a mean annual license of $150,000 to the central government.

Shipping. The Mexican merchant navy consists of 1,142 craft of all sizes, 364 of which are sea-going or large coasting vessels. In 1879, 145 American vessels (tonnage, 76,321), and 175 foreign (tonnage, 83,273) cleared the ports of the U. States for the eastern ports of *M.*; and 42 American vessels (tonnage, 18,353), and 52 foreign (tonnage, 22,203), cleared for the Pacific ports. 167 American vessels (tonnage, 83,174), and 216 foreign (tonnage, 121,626), entered the ports of the U. States from the Gulf ports of *M.*; and 46 American vessels (tonnage, 14,746), and 52 foreign (tonnage, 16,466), entered from the Pacific ports.

Railroads and Lines of Steamers. The lines of railroads running in *M.* are as follows: —

		Miles.
1.	Vera Cruz to Mexico	263
1*a*.	Branch line from Apizaco to Puebla	30
2.	Mexico (in the direction to Toluca) to Cuantitlan	21
3.	Tacuba to San Bartolo (same direction)	4
4.	Merida to Progreso, constructed so far	15
5.	Celaya to Leon	6
6.	Esperanza (on the main line Vera Cruz to Mexico) to Tehuacan (tramway)	11
7.	Mexico to Cuernavaca, finished so far	2
8.	Mexico to Tacubaya, San Angel, Thalpam, San Cosme, Tacuba, and City Railroads (tramways)	44
9.	Vera Cruz to Talapa (tramway)	70
10.	Vera Cruz to Medelin (tramway)	14
	Total	479

On the Mexico and Vera Cruz Railroad, which belongs to an English Co. and was built at a cost of $27,000,000, there are 40 engines, of which there were constructed 3 by the Baldwin Locomotive Works, Philadelphia; 1 by the Danforth Works, New Jersey; 6 by the Roger's Works, Paterson, N. J.; 10 by Fowler & Co, Leeds, Eng.; 3 by Gowin & Co., Paris; and 17 are of Fairlie's patent, built in Bristol, England. The carriages and freight cars are nearly divided in manufacture between English and Americans. Of the latter many passenger cars were built by Jackson. On the other roads they have principally engines from the Baldwin and Danforth Works. All their carriages are from the U. States, mostly built by Jackson. The tramway cars are mostly from John Stephenson & Co., New York.

There is an American line of steamers between New York and the principal Gulf ports of *M.* every 20 days, calling at New Orleans and Havana. One French and 2 British lines of steamers ply regularly between St. Nazaire, Southampton, and Liverpool, and the Gulf ports of Vera Cruz and Tampico, touching at Havana, St. Thomas, Martinique, and Santander. There are also 2 American lines keeping regular communication between Acapulco and Panama and the intermediate ports of *M.* and Central America, and between Acapulco and San Francisco, and the intermediate ports of Manzanillo, Mazatlan, and Cape San Lucas.

The *Money, Weights, and Measures* of *M.* and the American equivalents are as follows: —

MONEY.

The *Dollar*, of 100 cents = $1.015.

WEIGHTS AND MEASURES.

The *Arroba*	for wine	= $3\frac{1}{4}$ gallons.
"	" oil	= $2\frac{1}{4}$ "
"	*Vara*	= 1 yard.
"	*Fanega*	= $1\frac{1}{2}$ bushels.

Seaports. Scarcely any of the ports on the Gulf of *M.* are good, — an accumulation of sand being constantly driven into them by the trade-winds. The most commodious harbors are by far those on the Pacific and the Gulf of California. The following are the chief ports for foreign trade: —

Acapulco, on a bay of the Pacific, in lat. 17° N., lon. 100° W. It has one of the finest harbors in the world, so capacious and secure that 500 vessels can lie at anchor in it with perfect safety. Its trade is inconsiderable. Pop. 5,000.

Campeachy, lies on the bay of the same name, on the W. coast of Yucatan, at the mouth of the Rio de San Francisco. Its harbor is so shallow that vessels are obliged to anchor some considerable distance from the town, and discharge and take cargoes by means of lighters and canoes. *C.* enjoyed formerly a monopoly of all the imports and exports of Yucatan, but its commerce has much declined, owing in part to the fearful ravages of epidemics, by which, in one year, two fifths of its pop. were carried off. Exports: logwood, wax, cotton, etc. Pop. 16,000.

Matamoras, in the State of Tamaulipas, on the right bank and 40 m. from the mouth of the Rio Grande, on the frontier of Texas, and 450 m. N. of Mexico. Good-sized vessels can be towed up to the town in fair weather; but at other times the entrance to the river, obstructed by sand-bars, is difficult and often impossible, even for schooners. Though reported a very unhealthy place, it is the only Gulf port exempt from yellow fever. The principal exports are specie, hides, wool, and horses. Imports: cotton, linen, woollen, and silk fabrics, and machinery. Pop. 12,000.

Mazatlan, one of the Pacific ports, in the State of Sinaloa, at the head of a bay at the entrance of the Gulf of California, 530 m. N. W. of Mexico. The climate is damp, and in summer excessively hot. Silver-mines abound in every direction, the most important of which belong to Americans. The commerce of this port seems to be on the decline. The principal articles of export are dye-woods, fine pearls, and gold and silver. Mining machinery and implements, sugar, fruits, and vegetables are brought from San Francisco. Pop. 13,500.

Sisal, on the N. coast of Yucatan, has a deep port, but is very much exposed to the north winds, which prevail in the Gulf of *M.* from October to April. It is the depot for the import and export trade of Merida, the capital of Yucatan, and for all merchandise transported to or from the interior of the State. Pop. 10,000.

Tampico, in the State of Tamaulipas, on the Panuco, 5 m. from its mouth on the Gulf of *M.* Its bar is dangerous, and its harbor considered unsafe. The town is situated in the midst of extensive marshes, and cannot be approached by large vessels. It exports sarsaparilla, hides, goat-skins, vanilla, wool, jerked beef, and Mexican hemp. It is the outlet of the precious metals and other productions of San Luis Potosi, Guanajuato, Zacatecas, and Durango. Pop. 8,000.

Vera Cruz, the principal seaport of *M.*, in lat. 19° 15′ N., lon. 96° 20′ W., on a sandy plain, interspersed with marshes, which bound the Gulf of *M.* Opposite the town, at the distance of about 400 fathoms, is a small island, on which is built the strong castle of St. Juan d'Ulloa, which commands the town. The harbor lies between the town and the castle, and is exceedingly insecure; it is little more than an exposed roadstead, and the mole completed in 1875 does not always afford a sufficient protection from the fury of the northerly winds (*los nortes*), which sometimes blow with tremendous violence. From the month of May to that of November, the usual period during which the northerns cease blowing, the unhealthiness of Vera Cruz is proverbial. A light-house is erected on the N. W. angle of the castle of St. Juan. The light, which is a revolving one of great power and brilliancy, is elevated 80 feet above the level of the sea, and is visible 15 m. off in clear weather. The port of Vera Cruz, which is connected with the city of Mexico by railroad, supplies a great part of the republic, and is considered by far the most important shipping point on either coast. The town is regularly and substantially built in the old Spanish style, the houses being variously colored, and having balconies, arcades, and galleries. Pop. 15,000.

Mexico (Gulf of). See GULF OF MEXICO.

Mezcal. See AGAVE.

Mezereon Bark, the dried bark of *Daphne mezereum*, the sponge laurel, which is employed medicinally, having acrid, laxative, and poisonous qualities. It is also used as a masticatory. It is imported in strips or quilled pieces of various lengths.

Mezquite, the Mexican name for a species of mimosa (*Prosopis glandulosa*), a small tree very common in Arizona, Texas, and the N. of Mexico. It exudes a soluble gum resembling gum-arabic.

Mezzo, an Italian word for half.

Mezzo-Relievo, in sculpture, demi-relievo; the projection of figures between alto and basso-relievo.

Mezzotint, a peculiar mode of engraving, resembling in its effects the old style of india-ink drawings, and of very rapid execution. It consists in scratching, by means of a tool called a cradle, the whole surface of the plate uniformly, so that an impression taken from it in that state would be entirely black; then tracing the drawing, and scraping and burnishing up the strongest lights, until the desired effect is produced. Some variations of this method have been adopted, but the distinguishing feature of this kind of engraving consists in the principle involved in the above method.

Mica, a mineral of complex nature, found in veins and fissures, also as a component ingredient in granite and mica slate. It splits up into remarkably thin plates or films, which have a peculiar glitter, something between pearly and metallic. So very thin and transparent are some of these films, that they are used as substitutes for glass in windows, the sides of lanterns, etc., and even in optical instruments. Their principal use, however, is for the openings of stoves, in order to afford a view of the fire, for which it is well adapted by its refractory character. When pounded, it is used as a bronzing powder, etc. It is often confounded with talc. It is sold by the pound. New York is chiefly supplied from Acworth, Grafton, and Alstead, in New Hampshire; and from Mitchell Co., in North Carolina, where extensive mines of *M.* were discovered in 1867. *Imp.* free.

Michigan, a N. W. State of the American Union, consisting of two distinct peninsulas, comprised between lat. 41° 30′ and 47° 20′ N., and lon. 82° 25′ and 90° 30′ W. The upper peninsula is for the most part enclosed between Lake Superior to the N., Lake Michigan to the S. E., and Wisconsin to the S. and W. The lower peninsula, forming the larger of the two divisions of the State, is bounded N. and N. E. by Lake Huron, E. and S. E., by Upper Canada and Lake Erie, S. by the States of Ohio and Indiana, S. W. by Illinois, W. by Wisconsin, and N. W. by the upper portion of the State. The latter, or N. division, included between Lakes Michigan and Superior, has a length of 316 m., with a width varying from 36 to 120; while the major or S. division is 416 m. long, and from 50 to 300 wide. The State possesses an aggregate lake-shore line of 1,400 m.; the united area being 56,243 sq. m., or 35,995,520 acres. *M.* is divided into 77 counties. *Lansing*, the capital, is situated in Ingham Co., on Grand River, 85 miles N. W. of Detroit, in the middle of a fertile country, abounding in timber and coal; it has an important and increasing trade. Pop. 10,000. *Detroit* is the commercial metropolis and the largest city of the State. (See DETROIT.) The other principal cities and towns are Grand Rapids, East Saginaw, Jackson, Bay City, Saginaw City, Kalamazoo, Adrian, Muskegan, Fort Huron, Flint, Ann Arbor, Monroe, Battle Creek, Marquette, and Ypsilanti. The total pop. of the State is about 1,600,000.

The northern peninsula of *M.* is more bold, rugged, and picturesque than the southern, or peninsula proper; which, on the other hand, is richer in agricultural productiveness, and is in a much more advanced state of settlement. The E. portion of the former rises gradually from the lake shore into an elevated plateau, and swells westwardly into hills, which finally enlarge into the Porcupine Mountains (the dividing ridge between Lakes Superior and Michigan), the highest peaks of which attain an altitude of 1,800 to 2,000 feet above sea-level. The shores of Lake Superior abound in striking and romantic scenery, prominent among which are the Pictured Rocks, masses of party-colored sandstone, worn by attrition of the waves into fantastic shapes, resembling ruined castles and temples. They are situated 60 m. from the Sault Ste. Marie. The S. peninsula is, on the whole, mostly level, or more undulating in character, although its shores are in some parts rocky and broken, and, along Lake Huron, high and precipitous. The central region consists of a table land, little elevated above the level of the surrounding lakes, to which it slopes in every direction. Its surface is also diversified by beautiful prairie lawns or parks, commonly called *oak-openings*, being stretches of level country, with a scattered growth of trees, intersected with prairies and heavy timber. The soil is excellent, especially in the middle and S. sections of the lower peninsula, being generally free from encumbering rocks, and composed of a deep, dark, rich sandy loam, often mingled with gravel and clay. The surface and soil of the upper peninsula are various, a considerable portion consisting of sterile sand-ridges and marshy tracts; while the other, or hilly, tracts are generally covered with dense pine forests. The whole of this region is inhabited principally by Indians, and only occasionally visited by traders in furs and peltry. The climate is severe; little or no agriculture is practised, and the fur-trade and fisheries are its chief sources of wealth. Both peninsulas contain extensive tracts of heavy timber, furnishing large quantities of lumber and fuel for domestic use and for exportation, the trees embracing white-pine, spruce, hemlock, birch, every variety of oak, walnut, hickory, maple, and ash. Many varieties of woods suitable for fine cabinet-work are found within the limits of the State, and its pine forests are noted as the source of excellent building material, supplying a large portion of the neighboring States. Fewer prairies exist in this than in any other State of the N. W. region, and the largest is only a few miles in circuit. — The upper peninsula, which is especially rich in this endowment, is mostly of primitive geological character; while the lower, on the other hand, is exclusively secondary. The copper deposits among the primary rocks of the N. section are the richest in the world, the cupreous belt being 120 m. long, and from 2 to 6 m. wide. A block of several tons of almost pure copper, taken from the mouth of Ontonagon River, on Lake Superior, has been built into the wall of the Washington Monument at the national capital, and a mass, weighing 150 tons, was uncovered, in 1854, in the N. American mine. Isle Royale, about 45 m. from Keewenaw Point, on Lake Superior, is one of the best mining localities, producing copper ore in association with silver. The principal shipping-points of this mineral are Portage Lake, Keewenaw, and Ontonagon. According to the last census there were in *M.* 27 copper-mines, with 86 steam-engines and 5,943 horse-power; capital invested, $5,866,374; hands employed, 4,188; wages paid, $2,346,535; value of product, $4,312,167. In Marquette Co., on the N. peninsula, are large and rich deposits of iron, *M.* being only second to Pennsylvania in the products of this mineral (See IRON.) Bituminous coal is mined on an enlarging scale, to meet the demand of manufacturers. Salt also exists in quantities amply repaying the employment of capital The climate of *M.* is less severe than in the same parallels in the neighboring British provinces, being equalized and ameliorated by the immense bodies of fresh water on the border. The winters are long and often severe, but the atmosphere is more humid, and the climate, upon the whole, milder than that of the States more to the E. The average annual temperature is admirably suited to wheat throughout the State, while in the S. part even good crops of maize are raised, as well as vast quantities of grapes, peaches, and the more delicate fruits. The colder and less genial climate of the N. portion, though admitting good crops of winter grain, is, however, not favorable to the cultivation of Indian

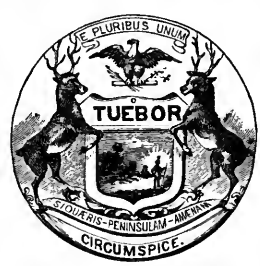

Fig. 349. — SEAL OF MICHIGAN.

corn. — The agricultural yield of *M.* is immense in wheat, rye, maize, oats, barley, buckwheat, potatoes, beans, and hay; also the products of the orchard and of the dairy. The production of maple-sugar, sorghum molasses, and honey is abundant and increasing. Tobacco is cultivated only to a partial extent, and large quantities are imported for manufacture Wool-raising is an important branch of husbandry. All kinds of garden vegetables and the fruits of the temperate zone thrive with care, and render an abundant return. The cultivation of hemp and flax has been introduced, and succeeds well Pasturage is generally good, but the live-stock is inferior, doubtless resulting from admixture of the commoner breeds Horses and mules are less employed than in the States more to the S., oxen being mostly used for field operations. The lakes and streams afford productive fisheries, among which are those of the far-famed whitefish. The relative value of agricultural products for the year 1879 is given in this work under the names of each of the principal crops.

The number of farms in *M*, as reported by the last census, was 98,786. The number of acres of land in farms was 10,019,-142, of which 5,096,939 were improved; cash value of farms, $398,240,578; of farming implements and machinery, $13,711,-979; estimated value of farm productions, $81,508,623; value of orchard products, $3,447,985; of produce of market-gardens, $352,658; of forest products, $2,559,682; of home manufactures, $338,008, of animals slaughtered, $11,711,624, of live-stock, $49,809,869. The total value of saw-mill products was greater than that of any other State In the quantity of lumber produced *M.* stood first; in the quantity of shingles, next to Wisconsin; and in the value of staves, etc., next to Indiana and New York. The manufacturing interests of *M.* are, year by year, rapidly increasing in importance; and the higher branches of manufacture have been introduced with success, imparting to the people the congenial and profitable occupation of a varied industry. The commercial portion of *M.* is one possessing remarkable advantages. It has 1,400 m. of lake navigation along its shores, and a water communication with the Atlantic Ocean. Its central position in the American continent gives it access to a vast internal trade. The St. Mary's Ship-Canal, constructed around the rapids at the junction of Lakes Superior and Huron, gives additional facilities for the commercial development of the great N. W. territory The railway system of this State has developed with wonderful rapidity. The 24 m of railroad was completed in 1840, and in 1879 there were 3,593 m. of road in operation. The following statement exhibits the names of lines in operation, their total length, their mileage in *M*, and their cost of construction per mile: —

Companies.	Total length of line.	Total length in State.	Cost per mile.
	M.	M.	$
Allegan and South-eastern	11.50	11.50	22,350
Chicago and Canada Southern	67 60	63.10	70,927
Chicago, Detroit, and Canada G. J	59 37	59 37	34,933
Chicago and Lake Huron	232.00	175.96	54,936
Chicago and North-eastern	50 00	50 00	45,000
Chicago and North-western	1,174 50	172.45	59,551
Chica, Saginaw, and Canada	24.00	24.00	12,053
Chicago and W Michigan	245.60	245 60	28,903
Detroit and Bay City	148.05	148.05	31.145
Detroit, Grand Haven, and Milwaukee.	191.65	191 65	65,047
Detroit, Hillsdale, and South-western.	64.80	64 80	20,576
Detroit, Lansing, and Northern	197.28	197.28	39,267
Detroit, Monroe, and Toledo	62.29	54 68	21,482
Flint and Pere Marquette	280.07	280 07	31,453
Fort Wayne, Jackson, and Saginaw.	100.00	47.42	31,738
Grand Haven	57 50	57.50	24,208
Grand Rapids and Indiana	332.10	279.83	33,397
Grand Rapids, Newago, and Lake Shore	46.00	46.00	32.856
Grand River Valley	82.40	82.40	34,466
Hecla and Torch Lake	4.50	4.50	43,265
Jackson, Lansing, and Saginaw	236.00	236 00	25,726
Kalamazoo, Allegan, and Grand Rapids	58.00	58.00	25,000
Kalamazoo and South Haven	40.00	40.00	22,498
Kalamazoo and White Pigeon	36 68	36.68	16,378
Lake George and Muskegon River	9.33	9.33	5,892
Lake Huron and South-western	13.00	13.00	
Lake Shore and Michigan Southern	864.60	192.63	92,507
Marquette, Houghton, and Ontonagon	88.52	88.52	93,607
Menominee River	24.71	24.71	16,425
Michigan Air-Line Railway	26.00	26 00	11,625
Michigan Central	270 00	221.00	106,854
Michigan Central Air-Line	114.72	109.10	27,593
Michigan Midland and Canada	15.00	15.00	39,176
Mineral Range	12.50	12.50	29,850
Northern Central Michigan	61.14	61.14	24,942
Paw Paw	4.00	4 00	7,500
Pinconning	21.50	21.50	11,321
Port Huron and North-western	10.00	10.00	
Saginaw Valley and St. Louis	34 80	34.80	24,345
Toledo and Ann Arbor	46.00	40 00	13,528
Toledo, Canada Southern, and Detroit	55.40	48.26	54,444
Toledo and South Haven	9.00	9 00	6,157
Traverse City	26.00	26.00	17,660

M. is divided into the four following customs districts: Detroit, Huron (port of entry Port Huron), Michigan (port of entry Grand Haven), and Superior (port of entry Marquette) Its direct foreign trade is entirely with Canada. The following table shows the value of imports and exports for the year 1879: —

Districts	Imports.	Dom Exports.	For. Exports.
Detroit	$1,342,600	$2,475.386	$62,346
Huron	1,118,362	5,836,031	103,580
Michigan	270	74,436	.... ..
Superior	50,271	93,329	165
Total	$2,511,503	$8,479,182	$166,091

The following statement exhibits the number of vessels, and their tonnage, which entered and cleared the ports in the above foreign trade: —

Districts	Entrances.		Clearances.	
	Vessels.	Tons.	Vessels.	Tons
Detroit	2,949	236.339	2,852	231,739
Huron	905	678,862	844	704,743
Michigan	26	8,148	17	5,811
Superior	382	154,097	377	153,281
Total	4,262	1,077,446	4,090	1,105,574

The principal imports are cattle, fruit, and provisions. while the chief articles of export consist of grain, flour, hogs, lumber, beef and pork, tobacco, cotton, and railroad cars A large proportion of the exports from the district of Huron is transported by land-carriage. The number of vessels engaged in the coastwise trade, which entered and cleared the ports in 1879, was as follows:—

Districts.	Entered.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage
Detroit	2,449	773,460	2,539	788,249
Huron	3,264	982,755	3,261	981,365
Michigan	8,272	1,963,285	8,595	2,071,590
Superior	1,783	902,496	1,792	907,463
Total	15,768	4,621,996	16,187	4,748,667

The following table shows the number and tonnage of vessels registered, enrolled, and licensed, belonging to the four customs districts, and also the number of vessels built during the year 1879: —

Districts.	Registered.		Built in 1879	
	Vessels.	Tonnage	Vessels	Tonnage.
Detroit	308	64,462	11	2,491
Huron	273	48,716	8	1,116
Michigan	263	25,799	18	903
Superior	67	6,010	7	781
Total	911	144,987	44	5,291

Of the 911 vessels belonging to the State of *M.* 426 (tonnage 52,337) are sailing vessels, 362 (tonnage 61,210) are steamers, and 122 (tonnage 31,441) are barges

In 1879 *M.* had 79 national banks in operation, whose paid-up capital was $9,514,500. There were besides 153 State banks, savings-banks, and private bankers, whose aggregate capital was $2,636,707. The total State debt amounted to $959,149; and the sinking-fund to $678,251 The assessed valuation of real and personal property was $630,000,000, valuation per capita, $422 17; tax per capita, $0.57.

Michigan Central R.R. runs from Detroit, Mich., to Chicago, Ill., 284 m.; leased lines, 519.-72 m.; total length of lines operated, 803.72 m. The leased lines are the Michigan Air-Line, with the Niles and South Bend Branch; Jackson, Lansing, and Saginaw; Grand River Valley, Kalamazoo, and South Haven; and Joliet and Northern Indiana. This Co., located in Detroit, was chartered in 1846, and the main road was completed in 1852.

In 1879 its General Balance Account stood as follows: —

Construction Account	$28,437,937.67
Branches and Leased Lines	4,631,963.33
Materials on hand	220,061.61
Detroit and Bay City R.R.	289,271.78
Sundry Securities	672,619.11
Trustees — Equipment Bond	545,245 82
Sundry Accounts and Dues	157,642.45
Cash on hand	187,530.49
	$35,142,272.26

Capital Stock	$18,738,204.00
Funded Debt	11,291,000.00
Air Line Mortgage Bonds	1,900,000.00
Bills Payable	20,960.57
Income Account	3,192,107.69
	$35,142,272.26

The leased lines are operated on the following conditions: Air-Line, payments of interest on the construction bonds, and of principal when due; Grand River Valley, interest on its bonds, and 5 per cent on $492,000 stock; Jackson, Lansing, and Saginaw, interest on its bonds, and, after 1874, $700,000 additional; Joliet and Northern Indiana, 8 per cent on estimated cost, being $89,000 per year; Kalamazoo and South Haven, interest on bonds.

Michigan (Lake of), one of the five great lakes of North America, lies between lat. 41° 38′ 58″ and 46° N., lon. 84° 41′ and 87° 8′ W. In the northern parts it communicates with Lake Huron by the Straits of Michilimackinac or Mackinac, about four miles in width in its narrowest part, and by which and its northern part it separates the two peninsulas of Michigan. It is the largest lake that lies wholly within the U. States, being 320 m. long, and, on an average, 70 m. broad, containing 22,400 sq. m. It has Green Bay, a large branch, on the N.W.; and on the E., Grand Traverse Bay and Little Traverse Bay. It is estimated to be on an average 1,000 feet deep, and is elevated 578 feet above tide-water. It has few good harbors. On the W. side are those of Chicago, Milwaukee, Sheboygan, and Green Bay. On the E. side are Michigan City, St. Joseph, at the mouth of St. Joseph River, and Grand Haven near the mouth of Grand River. The lake has pure and clear water, it abounds in excellent fish, and affords great facilities for transportation, but is subject to severe storms at different seasons.

Mico, Mijo, a vegetable butter, or solid oil, made from *Soja hispida*, in Japan.

Micrometer, an instrument employed for measuring very small spaces; usually attached to a telescope, microscope, etc.

Microscope, a well-known optical instrument for magnifying and examining minute objects. Considered simply as an article of manufacture, and not in relation to its scientific uses, it is among the very highest developments of metal and glass working. So minutely accurate must all the parts be, that $\frac{1}{100}$ of an inch, and in some cases $\frac{1}{1000}$ is regarded as a seriously large quantity. Some of the lenses for *M.* have only $\frac{1}{75}$ of an inch focal length, a closeness which requires an accuracy of curvature almost inconceivable. A great refinement in mechanical detail has been rendered necessary by the introduction of Wenham's *binocular M.*, in which the two eyes look down two tubes to the object which is under process of magnifying; the constructional manipulations of the brass-work, to preserve the proper focalizing under these conditions, are of the highest order, and can be executed by none but first-rate workmen.

Microspectroscope, a spectroscope connected with a microscope, in order to more accurately measure the absorption lines.

Middleman, one who stands in the middle, as, between buyer and seller, or landlord and tenant.

Middling, of mediocre quality; passable.

Middlings, a miller's name for the finest kind of bran, which contains a large portion of the flour of the grain.

Midship, in the middle of the vessel, equidistant from the bulwarks.

Midwife, a female accoucheur.

Migrate, to pass or remove from one region or climate to another; the term is generally applied to birds and fishes, many species of which are migratory.

Milch-Cow, a cow yielding milk. See Milk.

Mildew, a disease in plants; a blight or rust in wheat, etc.

Mile, an itinary or long measure, equal to 8 furlongs, 320 rods, 1,760 yards, or 5,280 feet. The following table, given on the authority of Kelly's *Cambist*, shows the length of the modern mile, and also the league, of various countries, and their relation to the English statute mile: —

	Yards.	*Stat. m.*
English statute mile	1,760	1 000
Italian mile	1,808	1.027
Ancient Scottish mile	1,984	1.127
Irish mile	2,240	1.273
French posting league (4 kilom.)	4,374	2.485
Spanish judicial league	4,635	2.634
Portuguese league	6,760	3.841
German short mile	6,859	3.897
Spanish common league	7,416	4.214
Danish mile	9,244	4.684
Hungarian mile	9,113	5.178
Swiss mile	8,153	5.201
German long mile	10,126	5 753
Swedish mile	11,700	6.648

According to the same authority, the Arabian mile is 2,148 yards, the Persian parsang 6,086 yards, the Russian verst 1,167 yards, and the Turkish berri 1,826 yards. The English geographical mile is $\frac{1}{60}$ of a degree of latitude, or about 2,025 yards. The geographical league of England and France is 3 such miles, or 6,075 yards; and the German geographical mile is equal to 4 English geographical miles, or 8,100 yards.

Mileage, the rate of fare per mile; fees paid for travelling, when proceeding by rail.

Milford-Haven. See Great Britain (Seaports).

Military-Goods, sashes, caps, hats, epaulettes, plumes, gloves, small and side arms, and all articles for personal equipment.

Milk [Fr. *lait;* Ger. *Milch;* It. *latte*], a fluid secreted by the female of all those animals denominated *mammalia*, and evidently intended for the nourishment of her offspring. The *M.* of every animal has certain peculiarities which distinguish it from all other *M.*, but the external character of all *M.* is that of a white opaque fluid, having a sweetish taste, and a sp. gr. somewhat greater than that of water. When allowed to remain at rest, it separates into 2 parts; a thick whitish fluid called *cream*, collecting in a thin stratum over its surface, and a more dense watery body, remaining below. *M.* which has stood for some time after the separation of the cream, becomes acescent, and then coagulates. When the coagulum is pressed gently, a serous fluid is forced out, and there remains the caseous part of the milk, or pure cheese. Butter, one of the most valuable animal products, is solidified cream, and is obtained artificially by churning. Either in its natural state, or in the form of butter or cheese, *M.* is an article of diet so useful, whole-

some, and palatable, that dairy management, which includes all that concerns its production and treatment, constitutes a most important branch of husbandry. The physical conditions of the different countries of the world have determined in each case the most suitable animal for dairy purposes. The Laplander obtains his supplies of *M.* from his reindeer, the roving Tartar from his mares, and the Bedouin of the desert from his camels. In the temperate regions of the earth many pastoral tribes subsist mainly upon the *M.* of the sheep. In some rocky regions the goat is invaluable as a *M.*-yielder; and the buffalo is equally so amid the swamps and jungles of tropical climates. The milking of ewes was once a common practice in Europe; but it has fallen into disuse because of its hurtful effects upon the flock. A few milch asses and goats are here and there kept for the benefit of infants or invalids; but with these exceptions the cow is the only animal now used for dairy purposes in this country. Cows of every kind are used for the dairy; but there are several of our breeds of cattle which are called, *par excellence*, "the dairy breeds." See CATTLE (NEAT). Whatever the breed, the quality is much influenced both by the age of the cow and by the way in which she is fed. So clearly is it ascertained that the *M.* of cows not exceeding four years of age yields a larger proportion and richer quality of curd than the *M.* of older animals, that it is customary in some of the cheese-making districts to draft off the cows to the grazier after they have borne two or at most three calves each. Cows that are prized for their pedigree, however, are of course kept for longer periods, and few will part with a good cow so long as she continues to yield abundance of *M.* In large, well-conducted dairies, especially where, as in a yearly increasing number of cases, shorthorns are kept, the cows are fed so well that they are sold to the butcher at very nearly their original cost as milch cows. The quantity of *M.* produced per cow varies so widely according to breed, age, feeding, and general care given to dairy management, that no reliable average could be made to sum a total production in this country, but some idea of its magnitude may be inferred from the following statistics, and from the fact that for the year 1879, after supplying all the wants of the country, 38,248,016 lbs. of butter, valued at $5,421,205, and 141,654,474 lbs. of cheese, valued at $12,579,968, were exported. While in Germany there were 8,961,221 milch cows; in France, 4,513,765; in Great Britain, 3,708,766; in Denmark, 800,000; in Sweden, 1,356,576; in Norway, 741,574; and in Switzerland, 592,463; the number in the U. States in 1879 was 11,826,400, distributed among the several States as follows: —

States.	Number.	Avr'ge price.	Value.
Maine	169,100	$22 70	$3,838,570
New Hampshire	98,100	26.28	2,578,068
Vermont	217,800	25 00	5,445,000
Massachusetts	160,700	32.50	5,222,750
Rhode Island	22,000	33 00	726,000
Connecticut	116,500	29.50	3,436,750
New York	1,446,200	23 37	33,797,694
New Jersey	152,200	35 46	5,397,012
Pennsylvania	828,400	20.26	16,783,384
Delaware	23,200	26.00	603,200
Maryland	100,500	25.73	2,585,865
Virginia	238,200	17 89	4,261,398
North Carolina	232,300	22.22	5,161,706
South Carolina	131,300	13.41	1,760,733
Georgia	273,100	13.98	3,817,938
Florida	70,000	12 62	883,400
Alabama	215,200	13 70	2,948,240
Mississippi	188,800	13.47	2,543,136
Louisiana	110,900	16.80	1,863,120
Texas	544,500	14.53	7,911,585
Arkansas	187,700	13 27	2,490,779
Tennessee	245,700	15.82	3,886,974
West Virginia	130,500	23.48	3,064,140
Kentucky	257,200	21 94	5,642,968
Ohio	714,100	27 50	19,637,750
Michigan	416,900	26.88	11,206,272
Indiana	439,200	23 60	10,365,120
Illinois	702,400	23 67	16.625,808
Wisconsin	477,300	20.88	9,966,024
Minnesota	278,900	19.10	5,326,990
Iowa	676,200	21.14	14,294,868
Missouri	516,200	17.80	9,188,360
Kansas	321,900	21 82	7,023,858
Nebraska	127,600	24 27	3,096,852
California	459,600	25.90	11,903,640
Oregon	112,400	18 56	2,086,144
Nev., Col., and the Territories	423,600	22.62	9,581,832
Total	11,826,400	......	$256,953,928
Grand average of prices	....	$21.73	....

Adulterations. "The specific gravity both of the whole *M.* and skimmed *M.* is ascertained by the GALACTOMETER (which see); but as these data are of little value without a knowledge of the proportion of cream, another instrument, invented by Sir Joseph Banks, and called the lactometer, is used in connection with the galactometer. It is a tube about $\frac{1}{2}$ in. in diameter, and 10 in. of its length graduated in tenths of an inch. When filled with *M.*, the tube is set aside for 12 hours for the cream to rise The proportion of this is then read off in the number of divisions occupied by the upper stratum. The thickness of this stratum is very variable with different sorts of genuine milk; but its general range is from 9 to 14 of the divisions, indicating as many percentages. Dr. Hassall thinks the average of pure *M.* does not exceed $9\frac{1}{2}$ of cream. Dr Normandy rates it at 8 to $8\frac{1}{2}$. The proportion of cream is also determined by an instrument invented by M. Donné of Paris, called the lactoscope, the principle of which is based upon the opacity of the fluid caused by the buttery particles. A few drops of the *M.* are introduced between two plates of glass, so set in an ocular tube that they can be brought close together or separated by means of a graduated screw, and thus enclose at their base a thinner or thicker stratum of milk. The observer then looks through the tube at a light set 3 ft. off, and gradually separates the plates of glass, increasing the depth of the layer of *M.*, till this at last becomes so opaque that the light is lost to view. The figure to which an index on the instrument then points refers to a table, upon which the corresponding quality of the *M.* as to quantity of cream is designated. As the large globules of cream are the first to rise, if this is removed the remaining skim-*M.* will contain only the smaller globules; and this has been used in Germany as a meaus of ascertaining whether milk has been skimmed —*M.* is easily adulterated by substituting various cheap materials for the natural ingredients, thereby seriously affecting its quality, while the fraud can be detected only by the skilful examination of the chemist. The nourishing cream is removed and water is substituted. This involves the addition of white thickening substances to disguise the cheat, and of other strange ingredients to restore or retain the sweetness and saltness of the milk. Large cities are almost hopelessly exposed to these frauds; but, worse than all, a large portion of the *M.* with which they are supplied is that of diseased cows kept in crowded stables and fed with cheap unwholesome food, especially the swill of distilleries."— *The American Cyclopædia.*

Condensed Milk. Considerable progress has been made in treating *M.* so as to render it capable of keeping for a length of time. The *condensed M.* of Mr. Gail Borden, Jr., from Litchfield Co., Conn., consists in cooling the milk as soon as it is drawn from the cow. It is then rapidly heated to 170° or 180° F., and is afterwards removed to vacuum pans in which evaporation of the water is effected at a temperature not exceeding 130° F. By evaporation the milk loses $\frac{3}{4}$ of its bulk, and the remainder, as a very thick cream, is put into small tin cases, soldered down, steeped in boiling water for a short time. and then allowed to cool. This essence of milk will keep good for a length of time. Various other forms of preserved milk are known. Grimwade's desiccated milk is made by mixing the milk with a little sugar and alkali. After the mixture has been heated over hot water till it is of the consistence of dough, it is dried into hard cakes, crushed between strong rollers, and bottled.—The Borden's process of condensing *M.*, which is also American, is protected by letters-patent. There are many other known processes, all of which require great care and precision. Condensed milk was exported in 1879 to the value of $119 883. *Imp.* duty: Milk, 10 per cent; condensed, 20 per cent.

Milk-Can, a large tin vessel holding several gallons, in which milk is brought by railroad or other conveyance from the farms.

Milkmaid, a woman who milks cows.

Milk-Pail, a large tin bucket with a handle, used for carrying out milk for sale.

Milk-Punch, a luscious liqueur consisting of spirits and milk, sweetened and spiced.

Milk-Vat, a deep pan for setting milk to raise cream or curdle for cheese.

Milk-Walk, the district served by a milkman, often yielding a large and profitable return, and the good-will of which is frequently sold.

Milk-Wood, a common plant of the West Indies, the *Brosimum spurium*, which furnishes a useful fibre.

Milk-Wort, a wild plant with bitter properties, the *Polygala vulgaris*, used in pulmonary affections, and as a remedy in spitting of blood.

Mill, a machine for grinding. (See FLOUR-MILL, CORN-MILL, etc.) A building or factory containing machinery. A lapidary's term for his different wheels, which are called roughing-mill, cloth-mill, etc. — The thousandth part of a dollar. — In die-sinking, the hardened steel roller having the design in *cameo*, and used for impressing in *intaglio* a plate, or a copper cylinder. — To serrate or dent the edge of coin. — To mull or throw silk before it is dyed.

Mill-Band, a band for machine-shops or for driving-wheels.

Mill-Board. See CARD-BOARD.

Mill-Cog, the tooth of a water-wheel.

Mill-Dam, a mound or embankment to keep up water to turn a mill.

Milled, marked or rolled on the edges, as the silver and gold coins. — Steel rolled into bars.

Millefiore-Glass, a species of mosaic enveloped in a transparent bulb. A number of pieces of filigree, or tubes of glass enamel, are fused together, their sections representing stars, flowers, and other ornaments. Sections of these tubes are imbedded in white transparent flint-glass, forming paper-weights.

Miller, one who grinds corn.

Millet, a kind of grain, *Setaria Italica*, imported into this country from Germany and the South of Europe, chiefly for feeding small birds. There is a variety of different species. In most countries lying under the warmer latitudes of the temperate zone the millets form a very essential article of domestic economy, being deprived of the husk and used whole as rice, or ground into meal and flour, and made into bread.

Mill-Gearing, the shaft, wheels, etc., by which the motion of the first moving power is communicated to any manufacturing machine.

Mill-Hand, a workman employed in a factory.

Millilitre, the thousandth part of the litre.

Millimètre, a nominal French lineal measure, the thousandth part of a mètre, and equal to 0.039371 inch.

Milliner, a person, generally a female, who makes and sells head-gear, as hats, bonnets, etc., for women's wear.

Millinery Goods, the materials used in the manufacture of ladies' bonnets, caps, and head-dresses, such as silks, satins, ribbons, laces, gauzes, feathers, artificial flowers, straw goods, bonnet-frames, bonnet-wires, etc.

Millinery Store, a store where ladies' bonnets, caps, and head-dresses are made and sold, which is properly the business of the milliner.

Millinet, a stiffened cotton material used by milliners for bonnet-lining. — A machine-made net.

Milling, the art or avocation of grinding or passing through a mill. (See FLOUR-MILL.) The art of making raised impressions on the edges of coin, etc., or the impressions thus made. — The art or process of fulling cloth.

Milling-Machine, a machine-tool for trimming metal surfaces by passing them on a travelling bed beneath a rotating serrated cylindrical cutter.

Millreis, a money. See BRAZIL and PORTUGAL.

Millstone [Fr. *pierre meulière;* Ger. *Mühlstein;* It. *mola macina;* Sp. *muela de molino*], one of a pair of large circular stones, which, when put in motion by machinery, grind wheat and other articles. The diameter of a common *M.* is from 3 to 7 feet, and the thickness varies from 8 to 18 inches. The weight of an ordinary pair of *M.* is from 1,300 to 1,700 lbs. The lower stone is firmly fixed in its bed, and is known as the *bedder.* The upper one, called the *runner*, is suspended over this so as to revolve with its lower face exactly parallel to the upper face of the lower stone, and more or less close to it according to the required fineness of the flour. The grain is admitted through a hole in the centre of the upper stone from the hopper above, and as it is ground the flour escapes round the outer edges. Grooves are cut on the face of each stone, radiating from near the centre to the periphery, and one edge of these grooves is sharp and perpendicular to the face. The two stones being cut alike, when they are turned face to face these edges work against each other and crush the grain between them. The grooves are called *furrows;* flat portions each side of the *M.* are called *lands.* The system of furrows and lands is called the *dress*, and the operation of preparing the face of a stone is called a *dressing.* The operation of hanging a runner, or adjusting the upper stone over the lower, is one of some delicacy; since not only must the two be rigorously parallel, but the distance between them must depend on the fineness of the flour to be produced, and on the rapidity with which the upper stone rotates. Other things being equal, the greater the velocity the closer must the stones be together, else the centrifugal force would drive away the corn unground or half-ground. The best *M.* are made of *buhrstone*, a hard, granular, silicious sandstone, having, in the best qualities, an equal proportion of solid matter and of vacant space. For making *M.*, blocks of buhrstone have to be carefully jointed together, and backed with a thick coating of concrete. They continue in use sometimes as long as 20 years, the edges being occasionally re-cut. The best buhrs come from Rouen and other parts of France; they are of a bluish-white color, with a regular proportion of cells, and, when 6½ feet in diameter, cost about $240 to $250 the pair. They are imported to a certain extent, the value of imports for the year 1879 amounting to $101,484. Georgia furnishes us in great quantity buhrstones of somewhat lower but good quality. Very hard granite, quarried at Esopus, New York, and other places, is also used for *M.*, but it does not compare favorably with buhrstone.

Imp. duty: buhrstones, manufactured or bound up into *M.*, 20 per cent; manuf. but not bound up (called skeleton stone), 20 per cent; in blocks, rough or unmanuf., free. *M.* other than buhr, manuf. wholly or in part, 20 per cent.

Millstone-Grit, a coarse-grained quartzose sandstone.

Millstone Pick, a tool for dressing millstones. It consists of a hard steel blade held in a stock, and in any position, by a wedge. A lip on the

heel of the blade sets in one or another of the notches in the stock, and permits to set it forward as it wears away.

Mill-Tool, a small roller having a denticulated surface for giving indentations corresponding thereto in metal by rotary pressure.

Milwaukee. See WISCONSIN.

Milwaukee and Northern R.R. runs from Milwaukee to Menasha, Wis., 102 m.; branch from Hilbert to Green Bay, 27 m.; total, 129 m. This road is leased to the Wisconsin Central R.R. Co., the rent being 40 % of gross earnings. The office of the Co. is in Milwaukee. Capital stock, $2,014,-700; funded debt, $2,134,000.

Milwaukee, Lake-Shore, and Western R.R. runs from Milwaukee to Clintonville, and from Manitowoc to Two Rivers, 162.40 m. The Milwaukee, Lake-Shore, and Western R. R. Co. was a consolidation of the Milwaukee, Manitowoc, and Green Bay, and the Appleton and New London R.R. Cos. It was sold under foreclosure in 1873, and the present Co., whose offices are in Milwaukee, was organized under the same name. The road was completed in 1878. Capital stock, $6,000,000 (of which $5,000,000 preferred, and $1,000,000 common); funded debt, $750,000.

Minargent, a jeweller's alloy, consisting of copper, 1,000; nickel, 700; tungsten, 50; aluminium, 10. It is one kind of aluminium bronze.

Mincing-Knife, a knife with one or several curved blades, used for mincing meat in a wooden bowl.

Mincing-Machine, a machine, of which there are several forms, for chopping food in small pieces. They act either by means of revolving knives in a barrel which has stationary intervening knives, or by guillotine knives acting upon a block rotating on a vertical axis.

Mine, an opening in the ground from which anything is dug. The name is not properly applied until an opening is made; although now the term is generally used to signify coal, lead, iron, and similar minerals before an opening is made for digging them out. In opposition to the underground works, which constitute the mine, properly so called, the term usually comprehends all the ground on the surface, together with the steam-engines, water-wheels, and other machinery and appendages for drainage, the extraction of ores and their mechanical preparation with various buildings and erections. (See MINING.) — A workman's term, in the iron districts, for the crude ore or iron-stone, which is variously designated raw-mine, green-mine, burnt-mine, etc. — An underground work, or boring, for blowing up with an explosive substance.

Miner, a searcher for ore; a workman underground.

Mineral, any body destitute of organization, which naturally exists within the earth or at its surface, and which is neither vegetable nor animal. Mineral substances useful in the arts are so exceedingly numerous that it is difficult to classify them. First come the various kinds of stone and slate available for building and engineering purposes. Then marble, alabaster, gypsum, sand, gravel, clay, loam, marl, lime, chalk. Next, the varieties of gem, precious stone, spar, and crystal. Still more important than these, the ores from which are obtained iron, copper, tin, lead, zinc, gold, silver, nickel, and the whole range of metals. The coal series claims a place by itself, for, though a mineral to us, coal had a vegetable origin. Honestones, emery, black-lead, alum, fuller's-earth, sulphur, phosphorus, nitre, borax, salt, soda, potash, all help to swell the list of mineral substances on which the skill and industry of our artisans are employed.

Mineral Blue. See BICE.

Mineral Charcoal, a combination of charcoal and coal, which is sometimes met with in the coal-measures.

Mineral Coal, a general term in which are included all varieties of coal, as lignite, bituminous coal, anthracite, etc.

Mineral Green, a prepared or artificial carbonate of copper.

Mineralogist, one possessing a knowledge of minerals.

Mineralogy, the science which treats of the properties of mineral substances, and teaches us to characterize, distinguish, and class them according to their properties.

Mineral Oils, naphtha, petroleum, bitumen, asphalt.

Mineral Paint, a kind of earth found in immense beds near Akron, Ohio, from whence it is exported to all parts of the U. States, and used as a paint.

Mineral Pitch. See BITUMEN.

Mineral Surveyor, an inspector of mines; one who understands the appearance of lodes, and the prospects of working for ores.

Mineral Teeth, artificial teeth of ground quartz, china clay, and other substances, pressed into moulds, colored, and then burnt to harden them.

Mineral Waters, natural or artificial waters impregnated with any mineral substances.

The different kinds of mineral water may be arranged in six divisions, viz., Acidulous, Alkaline, Chalybeate, Sulphurous, Saline, and Silicious springs. 1. *Acidulous springs*, of which the Sweet Springs of Virginia, and those of Seltzer, Spa, Pyrmont, and Carlsbad, in Europe, are the best known, generally owe their acidity to the presence of free carbonic acid. When poured from one vessel into another they sparkle, in consequence of the escape of carbonic acid gas. 2. *Alkaline waters*, or those which contain a free or carbonated alkali, either in their natural state or when concentrated by evaporation. These springs are rare, but some are found at St. Michael's, in the Azores. The water contains carbonate of soda and carbonic acid, and is almost entirely free from earthy substances. 3. *Chalybeate* or *ferruginous waters*, which are characterized by a strong, styptic, inky taste, and by producing a black color when mixed with an infusion of gall-nuts. The iron contained in these waters is most frequently in the form of protocarbonate held in solution by free carbonic acid. On exposure to the air the protoxide is oxidized, and the hydrated peroxide descends, leaving the reddish-yellow deposit ordinarily observed in the neighborhood of chalybeate springs. Waters of this kind are not uncommon. Among the most noted in this country are those of Bedford, Pittsburg, and Yellow Springs; and in Europe, Wiesbaden in Germany, and Tunbridge in England. 4. *Sulphurous waters* contain hydrosulphuric acid, and may easily be recognized by their odor. They also cause a brown precipitate when mixed with a salt of lead or silver. The springs of White, Red, and Salt Sulphur in Virginia, Aix-la-Chapelle in Rhenish Prussia, and Harrogate in England, afford examples of sulphurous waters. 5. *Saline springs* derive their character from saline compounds held in solution. The salts which are most frequently contained in these waters are the sulphates and carbonates of lime, magnesia, and soda, and the chlorides of calcium, magnesium, and sodium. In a few, potash is found; and Berzelius discovered lithia in the spring of Carlsbad. Among instances of saline springs may be mentioned those of Saratoga in the U. States, and Epsom, Cheltenham, Bath, Bristol, Barèges, Buxton, Pitcaithly, and Tœplitz in Europe. Sea-water may be regarded as one of the saline mineral waters. The water of the Dead Sea, however, possesses a far stronger saline impregnation than sea-water, as it contains one fourth of its weight of solid matter. It has a peculiarly bitter, saline, and pungent taste, and its sp. gr. is 1.22. 6. *Silicious waters* are very rare, and in those hitherto discovered the silica appears to have been dissolved by means of soda. The most remarkable of these are the boiling springs of the Geyser and Rykum, in Iceland. (See GEYSER.) The term *mineral water* is sometimes applied to those springs which have no claim to repute except for their extreme purity; such as those of Malvern and Holywell in England. The best-known *M. W.*

are now prescribed by physicians in certain diseases with as much confidence as any preparation known to the apothecary. So far as regards the actual making of artificial mineral water, soda-water will illustrate the class. See SODA-WATER.

Imp. duty: mineral or medicinal waters, artificial, in bottles or jugs, containing not over 1 quart, 3 cts. each, and 25 per cent; containing over 1 quart, for each additional quart or fractional part, 3 cts and 25 per cent, the same, not in bottles, 30 per cent. All not artificial mineral waters, free.

Miniature-Painter, an artist who takes likenesses on a small scale.

Minim, in apothecaries' weight, a division of the fluid drachm, which is made up of 60 minims.— A measure of time in music.

Mining. The art of extracting mineral riches from beneath the surface of the ground was one of the earliest, after agriculture, to which men applied their ingenuity. Most of the valuable metals, to which mining is chiefly applied, exist in ores or stony masses, and are at some considerable distance below the surface, requiring, therefore, much digging and raising to obtain the ore, and many kinds of process to extract the metal. Sometimes, where metalliferous veins exist high up a mountain, the mountain-streams contain, in their beds or their sides, much metal in the gravel, sand, and mud washed down gradually by rains and running water, the alluvium is in such cases washed and sifted, and the metal separated for smelting. In most instances, however, the ground has to be dug with pick and shovel to get at the ore. Although each kind of metal calls for its own particular details in extraction, yet mining presents a general similarity for them all. The great depth to which the diggings sometimes go has called for the use of inventive skill in the modes of raising ore and raising and lowering workmen, while the floods of water met with in the mine have always required powerful pumping apparatus; indeed, the steam-engine first became a mighty machine on account of the wants of the miners. The locomotive and the railway may be said in like manner to have had their birth in the mines; for the tramways at the collieries, and the locomotive to draw the teams or wagons, preceded the passenger railways. The ore which is rich in metal is distributed in rocks of various kinds, and in portions varying greatly in amount. It may alternate with beds of hard rock, or may occupy cracks and fissures in rocks, or may occur in rounded nodules or separate fragments. Cracks containing metallic ores are *veins* or *lodes;* those containing non-metallic minerals are *dykes* and *cross-courses.* The veins or lodes are the only parts which yield profit; and therefore the richness of the mine depends on the ratio between the quantity of vein and the quantity of rock. The veins greatly vary in width, thickness, length, dip, and direction; so much so that the prospective value of any one vein is very problematical. And not only so, but a vein may vary so much in richness in different parts, that a width of 3 inches may be better worth working than one of 30 feet. Most of the rich veins run nearly east and west, and not far from vertically. The *veinstone*, or contents of the vein, consists of *gangue* and *ore;* the former stone without metal, the latter a metallic earth or stone. As the metallic deposits are not visible at the surface of the ground, the miner adopts many modes of finding out where they are. A quarry or excavation will sometimes accidentally lay bare a lode; or a test may be obtained by boring; or *shoadstones* (isolated fragments) may serve as a clew; or water flowing from a particular spot may be found impregnated with metal; or trenches may be cut in alluvial soil by a process called *costeaning;* or a horizontal *adit*, or *level*, may be excavated into a hill from the sides of a valley; or inferences may be drawn from the direction of neighboring veins. The position of a vein being approximatively ascertained, and the commercial and working plans of the company settled, the ground is opened in two ways,— by sinking a *shaft* down upon the vein, and by driving an *adit* or level from a neighboring valley. Either or both of these plans are adopted, according to circumstances. In both kinds there is much digging, and much propping of sides and roof with timber. Shafts are mostly vertical, though sometimes a little inclined, and are dug in the solid rock; while horizontal cuttings, at various depths, connect the shaft with the veins. The miners speak of *sinking* a shaft, and *driving* a gallery or horizontal passage. The galleries are usually about 6 feet high by 3 or 4 broad; and access to various parts of the vein from them is gained by *cross-cuts.* There are often several *adits* or *day-levels*, opening at different heights into an adjoining valley, to aid in examining the mine, working it, and pumping it; some of these are several miles in length, one adit draining a number of mines in common.— There is not so much real digging in a mine as many persons would suppose. Much of the rock is brought down by *blasting*, in which *jumpers, hammers, scrapers*, and *tamping bars* are used, aided by *blasting cartridges* and *safety fuses.* The miner's other tools are chiefly the *pick*, the *wedge* or *gad*, and the *shovel.* He is lighted chiefly by candles (sometimes stuck in his hat), and in explosive coal-mines by the *safety-lamp.* The ore is wheeled in barrows or trucks along tramways to the bottom of the shaft, whence it is hauled up by steam or water power. Some of the hauling engines employed will raise 400 tons in twenty-four hours, from a depth of 1,000 feet, at a cost of 50 to 75 cts. for coals for every ton raised.— So deep are some of the coal and tin mines, that it becomes almost insupportably laborious for the men to descend to their work, and still more to ascend when the day's work is done. Some of the mines now reach a depth of 2,000 feet. In old times the ladders, about 50 feet long each, were placed nearly upright, to leave clear space in the shaft; afterwards, to ease the men, the ladders were shortened and placed more sloping, so that the series should form a zig-zag from top to bottom, the bottom of each ladder resting on a platform, or *sollar.* It used to take a man an hour to ascend the shaft of a very deep mine. A *man-engine* has been adopted in many mines to facilitate the ascent and descent. Two timber rods placed side by side extend vertically from top to bottom; each has a reciprocating up-and-down motion, with a range or distance of 6 feet, and each has a number of stages, also 6 feet apart. By stepping across from a stage on one rod to a stage on another, backward and forward, the miner (while descending) contrives to be always on one particular stage during the descending movement of that particular rod; and *vice versa* during his ascent The descent and ascent are thus made with very little muscular exertion. The rods are kept in up-and-down motion by steam-power or water-power. In coal and iron mines the more usual practice is to ascend and descend in *cages* suspended by chains or wire ropes, and worked from above. Sometimes the rope breaks, the cage is dashed to the bottom, and the men are killed; and sometimes, by overwinding, the cage is drawn too high and tipped over the framing at the top, with equally

fatal results. To obviate these disasters, various forms of *safety-cage* have been devised, embracing many ingenious contrivances. In mines of less depth it is not unusual to have an iron platform nearly the size and shape of the horizontal section of the shaft; the men stand upon the platform, and are raised and lowered by steam-power. See ORE-DRESSING.

Mining Agent and Broker, a dealer in shares.—A secretary or manager for mines.

Mining Company, a joint-stock association for carrying on operations in a mine.

Minion, a kind of type intermediate between brevier and nonpareil.

Minister, a high officer of state.—A priest.—An ambassador.

Minium, a kind of red lead obtained by exposing lead or its protoxide to heat, till it is converted to a red oxide.

Miniver, the white fur of the ermine, prepared spotted with black tails, which is in England a distinguishing mark of nobility. See ERMINE, and FUR.

Mink, Minx, a commercial name for the fur of the *Mustela vison,* a species of weasel, which is extensively used in the manufacture of ladies' victorines, muffs, capes, etc. See FUR.

Minneapolis and St. Louis R.R. runs from Minneapolis to Albert Lea, Minnesota, 108.5 m. The Co., which is located at Minneapolis, operates besides, under lease, the Minneapolis and Duluth R.R., 15 m. It was chartered in 1853, and the road was completed in 1877 to Albert Lea, where it connects with the Burlington, Cedar Rapids, and Northern R.R. Capital stock authorized, \$2,500,000 (paid in, \$2,000,000); funded debt, \$1,101,649.60. Cost of construction and equipment, \$3,504,002.

Minnesota, a N. W. State of the American Union, situated between lat. 43° 30′ and 49° 24′ N., lon. 89° 39′ and 97° 5′ W. It is bounded N. by British America, E. by Lake Superior and Wisconsin, S. by Iowa, and W. by Dakota. Extreme length N. and S., 380 m.; extreme breadth, 337 m.; area, 83,531 sq. m., being larger than the six New England States combined. It is divided into 76 counties. *St. Paul,* the capital, is a very thriving commercial city, situated on the Mississippi, near the E. border of the State, 400 m. N. W. from Chicago; pop. 35,000. The other principal cities are Minneapolis (pop. 17,000), Winona (9,000), Red Wing (6,000), Rochester (5,000), Duluth (4,500), Hastings (5,000), and Mankato (4,500). Total pop. of the State, about 800,000.

Lying near the centre of the continent, *M.* occupies the summit of the interior plateau formed by the converging basins of the Mississippi River, Lake Superior, and Lake Winnipeg; embracing the headwaters of the three great river-systems of N. America. Its series of undulating plains, seldom broken by abrupt elevations, and never rising into mountains, presents an agreeable variety of prairie, alternating with belts of heavy timber, and studded with beautiful lakes, the crystal waters and euphonious Indian names of which have become proverbial, and whose intercommunication, together with the large and numerous rivers, forms a system of internal navigation permeating all parts of the State. The surface is sufficiently rolling for all purposes of drainage, yet susceptible of easy cultivation. After the Mississippi, which rises in and drains this State for nearly 800 m (being navigable for 534 m.), the chief rivers are the Minnesota (334 m. in length, and navigable for 238 m.), the Red River of the North (379 m. long, and navigable for its entire length), and the St. Croix (130 m. long, and navigable for 52 m.). Besides these there are many others, with innumerable tributaries, the whole spreading out over every section of the State, and bringing almost to the door of every farmer the priceless boon of living water for stock, and water-power for mills and manufactories. The number, beauty, and picturesqueness of its lakes form a marked feature in the scenery of *M.* These lovely little sheets of water are found dotting its surface in nearly every section of the State. They are from 1 to 30 m. in diameter. The waters of these lakes are remarkably clear and pure, resting upon a basin of quartzose sand and pebbles, among which the jasper, agate, and carnelian appear conspicuous. These lakes abound with a great variety of fish of superior flavor and quality. Lake Superior washes the N. E. border of the State for about 150 m., after which the largest sheets of water are the Lake of the Woods, Rainy Lake, Vermilion Lake, Red Lake, Leech Lake, Mille Lacs, and Big Stone Lakes. It has been estimated that in a single body of 1,250,000 acres of land between the Mississippi and St. Croix Rivers, 73,000 acres are covered by small lakes. — The geological character of *M.* seems to be confined to the azoic and protozoic group, concealed by a thin superincumbent stratum of rift, extending over a large part of the country. The N. E. corner of the State, however, seems to be rich in minerals. Copper abounds in the mineral belt stretching along the N. shore of Lake Superior; iron ore of good quality is found around Portage and Pigeon Rivers; and large deposits of peat exist in all parts of the State. Superior slate exists in abundance near the St. Louis Falls. Limestone abounds in many places. Potter's clay has been found in large quantities, and extensive potteries established. The numerous salt springs in the Red River Valley are but the beginnings of the numerous salines which extend to the W., and will form the basis of great wealth to the State, as all the salt that can be made from them will be consumed in packing beef and pork in these extensive regions, and in domestic economy. Coal has not yet been found in quantities comparable to its development in the neighboring States; but lead gives promise of great abundance.— From its high latitude, the climate of *M.* is necessarily severe, particularly in the N. portions; yet it is accompanied by an equability which easily assimilates the human system to its low temperature, preventing those sudden changes which are insalubrious in lower latitudes. The climatic relations are very favorable to health and longevity, presenting many alleviations to the extreme cold of winter. Seasons of drought are unknown. The great lakes and rivers on the N. and E., with the many smaller streams and lakes, present so large a surface for the action of the sun's rays during summer, that evaporation is rapid, and is generally condensed by the cool nights, watering the earth with numerous and seasonable showers. — The prevailing soil in *M.* is a dark, calcareous, sandy loam, containing a various intermixture of clay, abounding in mineral salts and in organic ingredients derived from the accumulation of decomposed vegetable matter for long ages of growth and decay. Its peculiar excellence is shown in its adaptation to the culture of wheat, the great and unfailing staple of *M.* The valleys of the great rivers, especially the Mississippi and Minnesota, are very productive. Above the Falls of St. Anthony, with the exception of river alluvions and some prairie land, the country is covered with drift and marshes, restricting the area of effective cultivation. The agricultural character of the Red River country is excellent. Notwithstanding its high latitude, the State produces Indian corn of superior quality, and in considerable quantities. Wild rice, strawberries, currants, plums, and cranberries abound in the prairies. The principal trees are the sugar-maple, oak, elm, ash, basswood, black and white walnut, lime, butternut, hickory, cotton-wood, and boxwood, with immense forests of pine in the N. part, covering an area of not less than 21,000 sq. m.— No State possesses more natural advantages for crop-raising and pasturage. In almost every section there is an ample supply of timber, while the adjacent and rich prairies are ready for the plough of the husbandman. As the resources of this State are developed, they are found to increase in an extraordinary ratio, and are apparently almost inexhaustible. Immense progress has been made in all branches of agriculture during the last few years; and in 1879 *M.* ranked fifth among the States in the production of wheat. The relative value of agricultural products for the year 1879 is given in this work under the names of each of the principal crops. According to the returns given by the last census, the number of acres of land in farms was 6,483,888; of which 2,322,102 consisted of improved lands, 1,336,299 of woodland, and 2,825,427 of other unimproved soil; the cash value of farms under cultivation was \$97,847,442, exclusive of \$6,721,120 of implements and machinery; amount of wages paid for husbandry during the year, \$4,459,201: total value of farm products, \$33,446,400; of orchard stuffs, \$15,818; of market-gardens \$115,234; of lumber, etc., \$311,528; of home manufactures, \$174,016; of live-stock on farms, \$20,118,811. Among the striking and pre-eminent evidences of the future wealth and greatness of this State, none are more impressive than its inexhaustible

Fig. 350. — SEAL OF MINNESOTA.

water-power, unparalleled on the continent in its capacity, and unequalled in any State for a universal distribution in every direction. At St. Anthony's Falls alone, including the rapids, there is an hydraulic capacity of 120,000 horse-power, more than sufficient to drive all the spindles and mills of England and Scotland combined, — greater than the whole motive-power, steam and water, employed in textile manufactures in England, and nearly seven times as great as the water-power so employed. The St. Croix and St. Louis River Falls are second only to St. Anthony's in volume, and equally well located; the Pokegama Falls, Little Falls, Sauk Rapids, Cannon Falls, and Vermilion Falls, with the 43 rivers and creeks on the N. shore of Lake Superior, and hundreds of smaller cascades and rapids, combine to give *M.* a water-power for the State at large, and for almost every county, which challenges the world for a parallel. The principal manufacturing interests are located at the Falls of St. Anthony, mentioned above, and at Minneapolis. The vast pine forests of *M.* constitute an important source of wealth, the cutting and sawing of logs affording extensive employment for men and capital. The commercial position of *M.* is one of the grandest among the States. Occupying the exact centre of this continent, and constituting the water-shed of its eastern half, the steam navigation of three great internal water-systems terminates here, viz.: The Mississippi River, N. from the Gulf of Mexico; the Red River of the North, S. from Hudson's Bay; and the St. Lawrence River and chain of great lakes, W. from the Atlantic Ocean. *M.* is thus the focus of three cardinal radii of a vast commercial system. — The railroad system of the State has developed with a wonderful rapidity. *M.* had only 31 m. of railroad in 1863, while in 1879 there were 2,534 m. in operation. The following table exhibits the names of the railroad companies, the total length of roads, and their total length in *M.*:—

Companies.	Total length of line.	Total length of line in State.
	Miles.	Miles.
Burlington, Cedar Rapids, and Northern....	414.83	12.56
Central of Minnesota..........	40.00	40.00
Chatfield..........	12.30	12.30
Chicago, Clinton, Dubuque, and Minn.......	208.10	24.90
Chicago, Milwaukee, and St. Paul..........	1,512.33	352.10
Minneapolis and Duluth..........	15.00	15.00
Minneapolis and St. Louis..........	108.50	108.50
Minnesota Midland..........	60.00	60.00
Minnesota Valley..........	25.89	25.89
Northern Pacific..........	585.50	253.50
Plainview..........	16.00	16.00
Red River and Manitoba..........	33.50	33.50
Rochester and Northern..........	25 71	25.71
St. Paul and Duluth..........	156.00	156.00
St. Paul and Pacific..........	88.50	88.50
St. Paul and Pacific, 1st Div., Main Line.....	207.00	207.00
St. Paul and Pacific, 1st Div., Branch Line..	76.00	76.00
St. Paul and Pacific, Alexandria Extension..	69 00	69.00
St. Paul and Pacific, St. Vincent Extension..	141.00	141.00
St. Paul and Sioux City..........	121.27	121.27
St. Paul, Stillwater, and Taylor's Falls......	23.79	23.79
Sioux City and St. Paul..........	122.35	66.25
Southern Minnesota..........	167.50	167.50
Southern Minnesota Extension..........	43.30	43.30
Stillwater and St. Paul..........	13.00	13.00
Western of Minnesota..........	60.50	60.50
Winona and St. Peter..........	327.00	288.60
Winona, Mankato, and New Ulm..........	3.75	3.75
Worthington and Sioux Falls..........	58.60	43.60

M. has the two customs districts of Duluth and Minnesota, the port of entry of the last-named being Pembina on the Red River; St. Paul is a port of delivery. The imports at Duluth, for the year 1879, amounted to $22,987, and the exports to $37,613. The imports in the Minnesota district were $538,-244, and the exports $716,759. The chief articles of export were oats, carriages, cotton goods, fruits, machinery, nails and other manuf. of iron, pork, refined sugar, and timber. The number of registered, enrolled, and licensed vessels was 6 (tonnage 207) at Duluth, and 95 (tonnage 8,036) for the district of Minnesota. In the last-named district 54 vessels (tonnage 1,928) were built in 1879, of which 6 (tonnage 832) were steam-vessels.

In 1879 *M.* had 31 national banks in operation, whose paid-in capital was $4,968,700. There were, besides, 77 savings-banks and private bankers, whose aggregate capital was $1,-510,502. The State debt amounted to $500,000, but none of it was afloat, being loans from the several State funds. The assessed valuation of real and personal property was $229,791,-942; valuation per capita, $306.40; tax per capita, $0 45

Minor Coins. See Copper Coinage.

Minorca, the second in size of the Balearic Islands, belonging to Spain, in the Mediterranean, off the E. coast of Spain, from which it is distant 140 m. It is situated between lat. 39° 47′ and 40° 5′ N., lon. 3° 50′ and 4° 23′ E.; area, 283 sq. m. *M.* is of great commercial importance in the Mediterranean trade. Port Mahon, the capital and principal port, possesses a very safe and commodious harbor. Pop. of the island, 50,000.

Minstrel, a vocalist who accompanies himself on an instrument.

Mint, Spearmint, a plant, the *Mentha viridis,* which has a strong, peculiar, and pleasant odor. The leaves are used as a culinary sauce and salad, and being aromatic and carminative, are prescribed medicinally, and an essential oil is obtained from them. See Peppermint.

Mint, an official place for coining money. The U. States *M.* was established at Philadelphia, by act of April 2, 1792, for the purpose of a national coinage, to which were successively added several branch *M.* in other parts of the country. This branch of the public service was reorganized by act of 1873, under which the *M.* at Philadelphia, San Francisco, Carson City (Nevada), and Denver (Colorado), and the assay offices of New York City, New Orleans, Charlotte (N. Carolina), and Boise City (Idaho), are in operation. The bureau of the *M.* of the U. States is in charge of the director of the *M.*, who is under the general direction of the Secretary of the Treasury. Each *M.* is under the management of a superintendent. They are all placed upon substantially an equal basis; Philadelphia, however, is the principal *M.*, and there all medals are manufactured. The functions of an assay office (see Assay) are the same as those of a *M.*, with the single exception of the coinage. The usual forms in which the precious metals are received at the *M.* are as follows: *Gold bullion* — lumps, grains, and dust in their native state; amalgam with the quicksilver burned off; foreign coin; U. States defaced coin; jewelry, dentists' plates, bars, rings, etc. *Silver bullion* — foreign coin; U. States defaced coin; plate, bars, rings, etc.; native lumps and grains in their native state; and, as an accommodation to the holders, the coppery silver of Lake Superior, containing at least one fourth silver. The course of business at the *M.* is briefly as follows: Deposits of bullion, not less than $100 in value, are receivable by the Treasurer, who weighs the same in the presence of the depositor, and gives him a receipt therefor expressing the weight in troy ounces. Each deposit is kept separate during the process of melting and assaying, and until its precise value is determined. This is ordinarily accomplished in 2 or 3 days, when, on presentation of the original receipt, the net proceeds are paid to the depositor or his order. At the time of payment the Treasurer furnishes the depositor a "memorandum" exhibiting the weight of his bullion before melting and after melting, its fineness and value, the amount of silver contained if a gold deposit, and *vice versa,* the "deductions" for parting, coinage, or bars, and the net amount payable. The charges made to depositors are for parting when gold and silver are combined, for refining and toughening when required, for coinage or fine bars according as a deposit is paid in one or the other. They vary from ½ cent to 6 cents an ounce. The coinage charge at all the mints is 50 cts. per $100, and for fine gold-bars 6 cts. per $100. The charges for refining and toughening depend upon the condition of the metal deposited. Pure gold and silver are too soft to be coined; each metal, therefore, must be

alloyed with some other metal baser than itself, to give it greater hardness and durability. In the U. States, silver, in the manuf. of silver coin, is alloyed with copper in the proportion of 900 parts silver for 100 parts copper; and gold, in the manuf. of gold coin, is alloyed with an alloy of silver and copper in the proportion of 900 parts gold for 100 parts alloy of silver and copper, of which not more than 50 parts is allowed by law to be of silver. In practice a very small fraction of this alloy is silver. A portion of the incidental expenses of a *M.* are covered by the charges on deposits, but no commission or perquisites of any kind are enjoyed by any one belonging to the establishment. We might now proceed to describe the various processes employed in a *M.;* but, as they are multiple, minute, and difficult to understand without the use of numerous diagrams, it has been thought unnecessary to enter here into a matter which does not properly belong to commerce. The value of gold and silver of domestic production deposited at the *M.* and assay-offices from their organization (1792) to the close of the fiscal year 1878 is as follows:—

Locality.	Gold.	Silver.	Total.
Alabama.....	$217,233.31	....	$217,233 31
Alaska.......	22,852.89	....	22,852.89
Arizona......	1,935,631.90	$586,677.96	2,522,309.86
California....	686,506,692.69	1,246,962.77	687,753,655.46
Colorado......	29,984,158.59	15,846,879.20	45,831,037.79
Dakota.......	2,289,835 58	....	2,289,835.58
Georgia......	7,527,850 91	403.83	7,528,254.74
Idaho........	22,815,440.52	504,938.83	23,320,379.35
Iowa.........	192.58	468.00	660.58
Kansas.......	956,859.10	....	956,859.10
Lake Superior	....	2,524,919.46	2,524,919.46
Maryland....	402.12	....	402.12
Massachusetts	....	917.56	917.56
Michigan.....	....	1,196.87	1,196.87
Montana......	45,007,147 50	2,004,468.07	47,011,615.57
Nebraska.....	46,832 56	749,730.71	796.563.27
Nevada.......	12,108,589 64	61,208,123.45	73,316,713.09
N. Hamp.....	10,299.00	....	10,299.00
N. Mexico....	1,388,672.01	1,479,469.64	2,868,141.65
No. Carolina..	10,445,614.90	44,885 02	10,490,499.92
Oregon.......	14.256,106.92	3,232.12	14,259,339 04
So. Carolina..	1,384,550.24	4.45	1,384.554.69
Tennessee....	80,565.99	....	80,565 99
Utah.........	357,484.95	7,387,783.29	7,745,268.24
Vermont.....	10,800.41	....	10,800.41
Virginia......	1,648,718.09	....	1,648,718.09
Wash. Ter....	153,051.71	....	153,051.71
Wy, Ter......	672,389.92	11,793 86	684,183.78
Refin'd bullion	164,249,543 32	32,979,229.39	197,228.772.71
Part. fm silver	11,130,710.89	....	11,130,710.89
Con. in silver	9,321,107.50	....	9,321,107.50
Part. fm gold	....	6,407,879.01	6,407,879.01
Con. in gold..	....	512,472.90	512,472 90
Other sources	10,019,658.90	4,851,691.07	14,871,349.97
Total.....	1,034,548,994.64	138,354,127.46	1,172,903,122.10

Statement of coinage from the organization of the U. States M. to the close of the fiscal year 1879:—

Period.	Total Coinage.			
	Gold.	Silver.	Minor.	Total.
	$	$	$	$
1793-95	71,485.00	370,683.80	11,373.00	453,541.80
1796	102,727 50	79,077.50	10,324 40	192,129.40
1797	103,422.50	12,591.45	9,510.34	125,524.29
1798	205,610.00	330,291.00	9,797 00	545,698.00
1799	213,285.00	423,515.00	9,106.68	645,906.68
1800	317,760.00	224,296 00	29,279.40	571,335.40
1801	422,570.00	74,758 00	13,628.37	510,956.37
1802	423,310.00	58,343.00	34,422.83	516,075.83
1803	258,377.50	87,118.00	25,203.03	370,698.53
1804	258,642.50	100,340.50	12,844.94	371,827.94
1805	170,367.50	149,388.50	13,483.48	333,239.48
1806	324,505 00	471,319.00	5,260.00	801,084.00
1807	437,495.00	597,448.75	9,652.21	1,044,595.96
1808	284,665.00	684,300.00	13,090.00	982,055.00
1809	169,375 00	707,376.00	8,001.53	884,752 53
1810	501,435.00	638,773.50	15,660.00	1,155,868.50
1811	497,905 00	608,340.00	2,495.95	1,108,740.95
1812	290,435.00	814,029.50	10,755.00	1,115,219 50
1813	477,140.00	620,951.50	4,180 00	1,102,271 50
1814	77,270.00	561,687.50	3,578.30	642,535.80
1815	3,175 00	17,308.00	....	20,483.00
1816	....	28,575 75	28,209.82	56,785.57
1817	....	607,783.50	39,484.00	647,267.50
1818	242,940.00	1,070,454.50	31,670.00	1,345,064 50
1819	258,615.00	1,140,000.00	26,710.00	1,425,325.00
1820	1,319,030.00	501,680.70	44,075 50	1,864,786.20
1821	189,325.00	825,762.45	3,890.00	1,018,977.45
1822	88,980.00	805,806.50	20,723.39	915,509.89
1823	72,425.00	895,550.00	....	967,975.00
1824	93,200.00	1,752,477.00	12,620.00	1,858,297.00
1825	156,385.00	1,564,583.00	14,926.00	1,735,894.00
1826	92,245.00	2,002,090 00	16,344.25	2,110,679.25
1827	131,565.00	2,869,200.00	23,577.32	3,024,342.32
1828	140,145 00	1,575,600.00	25,636.24	1,741,381.24
1829	295,717.50	1,994,578.00	16,580.00	2,306,875.50
1830	643,105.00	2,495,400 00	17,115.00	3,155,620.00
1831	714,270 60	3,175,600 00	33,603.60	3,923,473 60
1832	798,435.00	2,579,000.00	23,620.00	3,401,055.00
1833	978,550.00	2,759,000.00	28,160.00	3,765,710.00
1834	3,954,270.00	3,415,002.00	19,151.00	7,388,423.00
1835	2,186,175 00	3,443,003.00	39,489.00	5,668,667.00
1836	4,135,700.00	3,606,100.00	23,100.00	7,764,900.00
1837	1,148,305 00	2,096,010.00	55,583.00	3,299,898.00
1838	1,809,595 00	2,333,243.00	63,702.00	4,206,540.00
1839	1,355,885.00	2,176,296 00	31,286.61	3,563,467 61
1840	1,675,302.50	1,726,703.00	24,627.00	3,426,632.50
1841	1,091,597.50	1,132,750.00	15,973 67	2,240,321.17
1842	1,834,170.00	2,332,750.00	23,833 90	4,190,753.90
1843	8,108,797.50	3,834,750.00	24,283.20	11,967,830.70
1844	5,428,230.00	2,235,550.00	23,987.52	7,687,767.52
1845	3,756,447.50	1,873,200.00	38,948.04	5,668,595.54
1846	4,034,177.50	2,558,580.00	41,208.00	6,633,965.50
1847	20,221,385 00	2,379,450.00	61,836.69	22,662,671 69
1848	3,775,512.50	2,040,050.00	64,157.99	5,879,720.49.
1849	9,007,761.50	2,114,950.00	41,984.32	11,164,695.82
1850	31,981,738.50	1,866,100.00	44,467.50	33,892,306.00
1851	62,614,492.50	774,397.00	99,635.43	63,488,524 93
1852	56,846,187 50	999,410.00	50,630.94	57,896,228.44
1853	39,377,909.00	9,077,571.00	67,059 78	48,522,539.78
1854	25,915,918.50	8,619,270.00	42,638 35	34,577,826.85
1855	28,977,968.00	3,501,245.00	16,030.79	32,495,243.79
1856	36,697,768.50	5,135,240.00	27,106.78	41,860,115 28
1857	15,811,563 00	1,477,000.00	63,510.46	17,352.073 46
1858	30,253,725.50	8,040,730.00	234,000.00	38,528,455.50
1859	17,296,077.00	6,187,400.00	307,000.00	23,790,477.00
1860	16,445,476 00	2,769,920.00	342,000.00	19,557,396.00
1861	60,693,237.00	2,605,700.00	101,660.00	63,400,597 00
1862	45,532,386 50	2,812,401.50	116,000.00	48,460,788 00
1863	20,695,852.00	1,174,092.80	478,450.00	22.348,394 80
1864	21,649,345.00	548,214.10	463,800.00	22,661,359.10
1865	25,107,217.50	636,308.00	1,183,330.00	26,926,855.50
1866	28,313,945.00	680,264.50	646,570.00	29,640,779.50
1867	28,217,187.50	986,871.00	1,879,540.00	31,083,598.50
1868	18,114.425.00	1,136,750 00	1,713,385.00	20,964,560.00
1869	21,828,637.50	840,746.50	1,279,055.00	23,948,439.00
1870	22,257,312.50	1,767,253.50	611,445.00	24,636,011.00
1871	21,302,475.00	1,955,905 25	283,760.00	23,542,140 25
1872	20,376,495 00	3,029,834.05	123,020.00	23,529,349 05
1873	35,249,337.50	2,945,795 50	494,050.00	38,689,183.00
1874	50,442,690 00	5,983,601 30	411,925.00	56,838,216.30
1875	33,553,965 00	10,070,368.00	230,375.00	43,854,708.00
1876	38,178,962 50	19,126,502.50	260,350.00	57,565,815 00
1877	44,078,199.00	28.549,935.00	62,165.00	72,690,299 00
1878	52,798,980 00	28,290,825.50	30,694.00	81,120,499.50
1879	40,986,912.00	27,227,882.50	97,798.00	68,312,592.00
Total.	1,076,045,892.00	264,390,999.40	13,013,195.55	1,354,349,781.45

During the fiscal year 1878, 43 gold, 784 silver, and 2,311 bronze, medals were manufactured in the *M.* at Philadelphia. For statistics of production of the different coins, see COPPER-COINAGE, DIME, DOLLAR, and EAGLE. See also MONEY.

Mintage, duty paid for coining.

Mint-Julep, a drink consisting of spirit and water, flavored with mint-leaves.

Minute, the 60th part of an hour. — The 60th part of a degree. — The 60th part of the lower diameter of the shaft of a column.

Minute-Book, a rough entry-book containing a sketch or note of the proceedings at committee-meetings, or the operations of public companies.

Minute-Glass, a sand-glass running for a minute.

Minute-Hand, the long hand or pointer of a watch or clock, which registers or indicates the minutes and seconds, as the short hand does the hours.

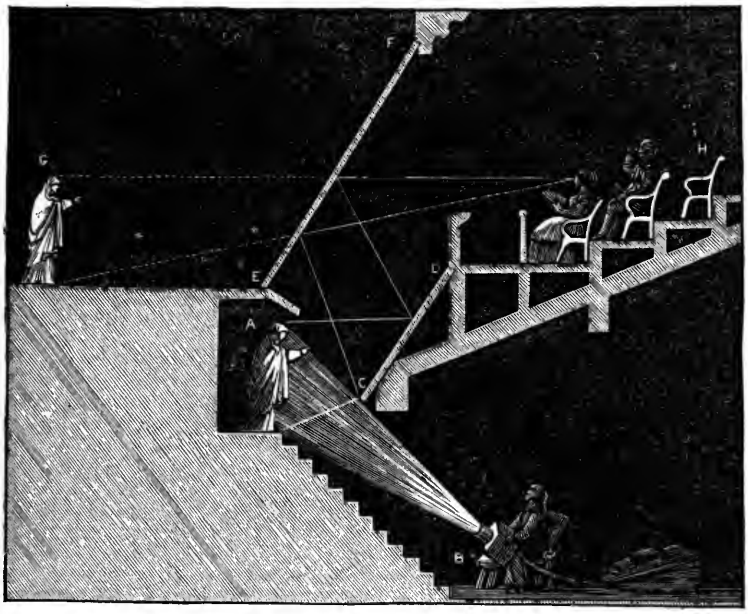

Fig. 351. — APPARATUS FOR GHOST ILLUSION.

Mirabilite, an efflorescence on the soil among salt springs in some countries, used as a substitute for soda in the manufacture of glass.

Mirage [Fr.], an optical illusion very common at sea, especially in high latitudes, and sometimes also witnessed on land, particularly in Egypt and Persia, and on the margin of rivers and lakes, or on the seashore. It arises from unequal refraction in the lower strata of the atmosphere, and causes remote objects to be seen double, as if reflected in a mirror, or to appear as if suspended in the air. When the effect is confined to apparent elevation, the sailors call it *looming;* when inverted images are formed, the Italians give it the name of *Fata Morgana*. Ships in the whale-fisheries are often descried, and sometimes known, by means of the mirage, at considerable distances.

Mirbane (Essence of), a mixture of benzole and nitric acid; an artificial oil of bitter almonds, used for scenting soap, and for flavoring confections and cookery.

Mirror, a speculum or looking-glass, or any other polished body capable of reflecting the images of luminous or illuminated objects. In ancient times *M.* were made of metal, but at the present day they are usually smooth plates of glass, tinned or silvered on the back, and are either plane, convex, or concave. A *plane M.*, or looking-glass, reflects the rays in a direction similar to that in which they fall on it; hence, objects are represented of their natural size by it. In a *convex M.*, the rays are made to diverge, and the images of objects seen in it are consequently diminished; while, in a *concave M.*, or *reflector*, the rays are collected into a focus, and then, at a certain distance, images are seen inverted and magnified. Large *M.* are made in the U. States, chiefly in New York, by silvering the plate-glass imported from Belgium, France, and England. See GLASS, SILVERING, SPECULUM.

Imp duty: hand-*M.*, 40 per cent. For other *M.*, see GLASS.

We may say here a word about the formation of several images from one object by using two mirrors. The most fundamental of the laws by which light is reflected are very simple, and for the purpose we have in view, it is necessary that they should be borne in mind. Let A B, Fig 352, be a *plane reflecting surface*, such as the surface of pure quicksilver or still water, or a polished surface of glass or metal, and let a ray of light fall upon it in direction D O, meeting the surface at O, it will be reflected along a line O R, — so that if at the point O we draw a line O P, perpendicular to the surface, the incident ray, D O, and the reflected ray, O R, will form equal angles with the perpendicular; in other words, the angle of incidence will be equal to the angle of reflection, and the perpendicular, the incident ray, and the reflected ray, will all be in one plane perpendicular to the reflecting plane. It would be quite easy to prove from this law that the luminous rays from any object falling on a plane reflecting surface are thrown back just as if they came from an object placed behind the reflecting surface symmetrically to the real object. The reflections, or *virtual images* in the mirror, behave optically exactly *as if* they were themselves real objects, and are reflected by other mirrors in precisely the same manner. From this it follows that two planes inclined to each other at an angle of 90° give three images of an object placed between them, the images and the object apparently placed at the four angles of a rectangle. When the mirrors are inclined to each other at an angle of 60°, five images are produced, which, with the original object, show an hexagonal arrangement. It was these symmetrically disposed images which suggested to Sir David Brewster the construction of the instrument so well known as the *kaleidoscope*, in which two — or, still better, three — mirrors of black glass, or of glass blackened on one side, are placed in a pasteboard tube, inclined to each other at 60°. One end of the tube is closed by two parallel plates of glass; the outer one ground, but the inner transparent, leaving between them an interval, in which are placed fragments of variously colored glass, which every movement of the instrument arranges in new combinations. At the other end of the tube is a small opening, on applying the eye to which one sees directly the fragments of glass, with their images so reflected that beautifully symmetrical patterns are produced, and this with endless variety. When this instrument was first made in the cheap form in which it is now so familiarly known, it obtained a popularity which has never perhaps been equalled by any scientific toy, and which seems to be lasting, for it is said that no fewer than 50,000 kaleidoscopes of an improved form were lately sold in a very short time by Messrs Jawicks & Co. of

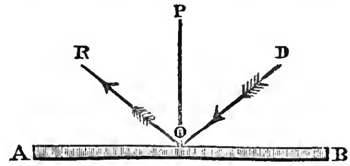

Fig. 352.

New York. — Advantage has lately been taken of plane mirrors for the production of spectral and other illusions, in exhibitions and theatrical entertainments, the improvement in the manufacture of plate-glass having permitted the production of enormous sheets of that substance. Among the most popular exhibitions of this class was that known as *Pepper's Ghost*, from the name of the patentee of the mirrors' arrangement. The principle on which the production of the illusion depends may be explained by the familiar experience of everybody who has noticed that, in the twilight, the glass of a window presents to a person inside of a room the images of the light or bright objects in the apartment, while the objects outside are also visible through the glass. As, by night coming on, the reflections increase in brilliancy, the darkness outside is almost equivalent to a coat of black paint on the exterior surface of the glass; but, on the contrary, in the daylight no reflection of the interior of the room is visible to the spectator inside, on looking towards the window. The reflections are present, nevertheless, in the daytime as well as at night, only they are overpowered and lost when the rays which reach the eye *through* the glass are relatively much more powerful. Even in the daytime the image of a lighted candle is usually visible, in the absence of direct sunshine, against a dark portion of the exterior objects as a background. The visibility, or otherwise, of the internal objects by reflection, and of the external objects seen through the glass, depends entirely on the relative intensities of the illumination, for the more illuminated side overpowers and conceals the other, just as the rising sun causes the stars "to pale their ineffectual fires." Hence, on looking through the window on a dark night, we cannot see objects out of doors unless we screen off the reflection of the illuminated object in the room. If the rays transmitted through the glass, and those which are reflected, have intensities not very different, we see then the reflected images mixed up in the most curious manner with the real objects. It is exactly in this way that the ghosts are made to appear in the illusion of which we are speaking. The real actors are seen through a large plate of colorless and transparent glass, and from the front surface of this glass rays are reflected which apparently proceed from a phantom taking a part in the scene among the real actors. The arrangement is shown in Fig. 351, where E G is the stage, separated from the auditorium, H, by a large plate of transparent glass, E F, placed in an inclined position, and not visible to the spectators, for the lights in front are turned down, and the stage is also kept comparatively dark. Parallel to the large plate of glass is a silvered mirror, C D, placed out of the spectators' sight, and receiving the rays from a person at A, also out of sight of the spectators, and strongly illuminated by an oxyhydrogen lime-light at B. The manner in which the rays are reflected from the silvered mirror to the plate-glass, and hence reflected so as to reach the spectators and give them the impression of a figure standing on the stage at G, is sufficiently indicated by the lines drawn in the diagram. The apparitional and unsubstantial character of the image is derived from its seeming transparency, and from the manner in which it may be made to melt away, by diminishing the brightness of the light which falls on the real person. The introduction of the second mirror was a great improvement, for by this the phantom is made to appear erect, while its original stands in a natural attitude. Whereas, with only the plate-glass, E F, the *ghost* could not be made to appear upright, unless, indeed, as was sometimes done, the plate was inclined at an angle of 45°, and the personator of the ghost lay horizontally beneath it.

Misalta, the name for pickled pork in Italy.

Mise-en-Scène [Fr.], the getting up for the stage.

Miser, a large auger of a cylindrical form, with a protruding lip, used for excavating earth in wet situations.

Mispickel, an ore of arsenic combined with iron, from which the white arsenic of commerce is obtained. It is found in Tennessee and New Hampshire and in various parts of Europe.

Misrepresentation, a false and fraudulent statement made by a party to an agreement or contract.

Misseltoe, Mistletoe, a parasitic plant, the *Viscum album*, which grows on the oak, used at Christmas for decorating rooms, and from its viscid berries bird-lime is made.

Missile, any kind of weapon which is thrown or designed to be thrown to the injury of others; a projectile.

Missing Ship, a ship which has not been heard of long after it is due and is presumed to be lost.

Mississippi, one of the Southern U. States, is situated between lat. 30° 10′ and 35° N., lon. 80° 30′ and 81° 35′ W., being bounded N. by Tennessee, E. by Alabama, S. by Louisiana and the Gulf of Mexico, and W. by Louisiana and Arkansas. It is 339 m. long from N. to S., and 150 m. broad; area, 47,156 sq. m. The State is divided into 73 counties. The principal cities are Vicksburg (pop. 13,000), Natchez (9,500), Columbus (5,000), Jackson, the capital (4,500), Meridan (3,000), and Holly Springs (2,500). Total pop. of the State, about 900,000.

The S. part of the State, for about 100 m. from the Gulf of Mexico, is mostly a sandy, level pine forest, interspersed with cypress swamps, open prairies, and inundated marshes, and a few hills of a moderate elevation. This region is generally healthy, and by cultivation produces cotton, Indian corn, sugar, etc. As you proceed farther N. the country becomes more elevated and agreeably diversified, and the soil is a deep, rich mould, producing abundantly cotton, Indian corn, sweet potatoes, peaches, melons, and grapes. The natural growth of timber consists of poplar, hickory, black walnut, sugar-maple, cotton-wood, magnolia, lime, and sassafras. The country in the N. of the State is healthy and productive, and the lands watered by the Yazoo through its whole course in the N. W. are very fertile. The Mississippi River, with its various windings, forms the entire W. boundary of the State for more than 500 m., and for more than three fourths of this distance down to Vicksburg, its margin consists of inundated swamps, covered with a large growth of timber, which admit of no port, and below Vicksburg the only one of much importance is Natchez. Back of these swamps the surface suddenly rises into what are called bluffs, and behind them the country is a moderately elevated table-land with a diversified surface. Cotton is the principal production of the State. The Yazoo is the largest river that has its whole course in the State. It rises in the N. W. part, and after a course of 250 m. enters the Mississippi. The Pascagoula River, after a course of 250 m., enters the Gulf of Mexico. At its mouth it widens into a bay. It is navigable for a considerable distance for small vessels. The Big Black River, after a course of 200 m., enters the Mississippi just above Grand Gulf. It has a boat navigation of 50 m. Pearl River rises in the central part of the State, and passing through it to the S., forming in its lower part the boundary between this State and Louisiana, enters Lake Borgne. Its navigation is much impeded by sand bars and obstructions of timber. The Homochitto is a considerable river which enters the Mississippi. Beside these, there are a few other small rivers and creeks. A chain of low, sandy islands, about 8 m. from the shore, enclose several bays or sounds, the largest of which are Mississippi Sound, Pascagoula Sound, and Lake Borgne. The number of farms in *M.*, as reported by the last census, was 68,023. The total number of acres of land in farms was 13,121,113; of which 4,209,384 consisted of improved lands, 7,959,384 of woodland, and 952,583 of other unimproved soil; the cash value of farms under cultivation, $81,716,576, exclusive of $4,456,633 of implements and machinery; amount of wages paid for husbandry during the year, $10,326,794; total value of farm products, $73,137,953; of orchard stuffs, $71,018; of market gardens, $61,735; of lumber, etc., $39,975; value of home manufs., $505,298; of live-stock on farms, $29,940,238. The manufacturing enterprise of *M.* has been hitherto little developed. The commerce of the State is mostly carried on through the ports of New Orleans and Mobile, having Natchez as its focal centre. Cotton and lumber are the chief exports. There are three customs districts: Pearl River (port of entry Shieldsborough), which has all the foreign and coasting trade, Natchez, and Vicksburg. The value of exports for the year 1879 was $230,053; of imports, $726. These returns, however, are very incomplete, and only include the direct commerce. Most of the imports for *M.* are entered in the port of New Orleans. The number of registered, enrolled, and licensed vessels in these customs districts were: in Pearl River, 154 (tonnage 5,923); Natchez, 7 (tonnage 541); and Vicksburg, 31 (tonnage 4,062). An extensive railroad system has been projected, and is progressing in *M.*, designed to place every important point in direct communication with the great marts of the country. In 1879, 1,126 m. were in operation, belonging to 16 lines, whose names are shown in the following table: —

Fig. 353. — Seal of Mississippi.

Companies.	Total length of line.	Total length in State
	Miles.	Miles.
Alabama Central	95 00	7.50
Alabama Great Southern	290.00	18.00
Chicago, St Louis, and New Orleans	571.66	320.00
Grand Gulf and Port Gibson	8.00	8.00
Greenville, Columbus, and Birmingham	10.00	10.00
Memphis and Charleston	292.00	36.00
Mississippi and Tennessee	100 00	90.00
Mississippi Valley and Ship Island	11.00	11.00
Mobile and Northwestern	16.00	16 00
Mobile and Ohio	528.60	312.80
Natchez, Jackson, and Columbus	43 00	43.00
New Orleans and Mobile	141.00	76.80
Ship Island, Ripley, and Kentucky	25 00	22 50
Vicksburg and Meridian	142 00	142 00
Vicksburg and Nashville	5 00	5.00
West Feliciana	27.50	7.50

In 1879 *M.* had no national bank in operation. There were 32 State banks, savings-banks, and private bankers, whose aggregate capital was $1,289,573. The State debt amounted to $3,558,629, exclusive of bonds to the amount of $7,000,000 repudiated by vote of the people in 1853. The valuation of property was $129,308,355; tax per capita, $0.50.

Mississippi and Tennessee R.R. runs from Grenada, Miss., to Memphis, Tenn., 100 m. This Co., which is located at Memphis, was chartered in 1852, and the road was completed in 1857. Capital stock, $825,400; funded debt, consolidated in 1877, $1,982,900. Cost of road and equipment, $2,956,654.

Mississippi River, the largest river of North America, and in length of navigable tributaries, and in extent of facilities afforded to commerce, the greatest river in the world. Its extreme source is Itasca Lake, in lat. 47° 10′ N., lon. 95° 54′ W., at an elevation of 1,500 feet, and the distance of 3,160 m. above the Gulf of Mexico. Itasca Lake is a beautiful sheet of water, lying among hills surmounted by pines. The outlet of the lake is 10 or 12 feet broad, and from 12 to 18 inches deep. Its course is then N. and N. E., and it passes through Lakes Irving and Travers, and then E. and S. E., and through some small lakes, to Lake Cass. From there it takes a S. S. E. course, and pursues it, with some deviations, to its junction with the Ohio. Its velocity during the passage through the lake region bordering on British America is in many parts very considerable. There are several cataracts, the largest being the Big Falls, at a spot where the stream divides and forms several islands; about 60 m. lower down, also, are the Falls of St. Anthony, 9 m. above the confluence of St. Peter's River; and here the stream, flowing in two channels, each between 200 and 300 yards broad, is precipitated over a limestone rock, 16 feet in perpendicular height. At this point ends the upper course of the *M.*, though rapids occur for several miles farther down, and even as low as the junction of the River Des Moines, in lat. 40° 20′ N. It is here about a mile broad, with transparent, light-blue, though not very deep waters; numerous islands stud its surface, and the current averages 2 m. an hour. Its banks are in many places bounded by broken and precipitous bluffs, ranging from 150 to 750 feet in height, intersected here and there by deep ravines, and covered with forests of pine, birch, maple, and cedar; but in some parts are rather extensive prairies, covered with the *Zizania aquatica*, a species of the cerealia, commonly, though erroneously, called *wild rice*, which forms a considerable article of food among the native Indians. Its principal affluents here are the St. Peter's, St. Croix, Chippewa, Wisconsin, Rock, Des Moines, and Illinois rivers, the last being by far the most important, and admitting of batteau navigation as far as the rapids, 250 m. above its mouth. The waters of the Missouri join those of the *M.* in lat. 38° 56′ N., and lon. 90° W., from which point the latter entirely changes its character. It is here about 1½ m. broad, and the Missouri enters from the W., nearly at right angles, not being more than one third the breadth of the streams into which it empties. The addition of the Missourian waters, while altogether changing the native purity of those of the *M.* by imparting to them its own muddy character, has not, however, the effect that might naturally be expected, of widening the surface of the main stream; for the united waters have from their confluence to the mouth of the Ohio only a medial width of about ¾ m. The junction of the Ohio seems also to produce no increase, but rather a decrease, of surface; and the river, in its natural state, is still narrower at New Orleans, which is only 120 m. from its mouth. Its depth, nevertheless, is so much increased, that, at the shallowest places, there are usually 6 feet water when the river is lowest. The rapidity of the current is more than doubled; and it presents, except in the dry season, a turbid and dangerous volume of water, passing between jagged and continually falling shores, and leaving, wherever its waters have receded, large deposits of mud. About 190 m. below the confluence of the Missouri, the *M.* receives the Ohio, flowing with its light-green stream from the E. bank, bringing with it also the waters of its great tributaries, the Wabash, Cumberland, and Tennessee. At this point, not only does the stream turn S. W., but the bluffs on both sides retire, and a fine, well-timbered plain extends on both sides the river, ranging (except at the Iron-banks and Chickasaw Bluffs, on the E. shore) from 30 to 50 m. in breadth; still expanding as it approaches the mouth, where it is probably 3 or 4 times that width. About 380 m. below the influx of the Ohio is the junction of the Arkansas and White rivers, which enter the main stream close to each other, on the W. bank. Thence to the confluence of the Red River is a distance, S. by W., of 360 m., measured along the stream; and below this latter point the river trends S. E., and enters the Gulf of Mexico, after a course of 335 m. from the Red River, of 1,075 from the confluence of the Ohio, and of 1,270 m. from that of the Missouri.

EXTENT OF STEAM NAVIGATION ON THE RIVERS, BAYOUS, ETC., CONNECTED WITH THE MISSISSIPPI BY CHANNELS NAVIGABLE FOR STEAMERS, 16,674 MILES.

Mississippi and Branches, Bayous, etc.

	Miles.		Miles.
Mississippi, proper	2,000	Spring	50
St. Croix	80	Arkansas (navigable at high water, 850 m.)	600
St. Peter's	1,120	Canadian	60
Chippeway	70	Neosho	60
Black	60	Yazoo	300
Wisconsin	180	Tallahatchee	300
Rock	250	Tallabusha	80
Iowa	110	Big Sunflower	70
Cedar	60	Little Sunflower	150
Des Moines	250	Big Black	90
Illinois	245	Bayou de Glaze	140
Maremec	60	" Care	40
Kaskaskia	150	" Rouge	60
Big Muddy	5	" La Fourchi	12
Obion	60	" Plaquemine	96
Forked Deer	195	" Teche	12
Big Hatchu	75	Grand River	"
St. Francis	300	Bayou Sorrell	12
White	500	" Chien	5
Big Black	60		

Missouri and Branches.

	Miles.		Miles.
Missouri, proper........	1,800	Osage..................	275
Yellow Stone..........	300	Grande.................	100
Platte or Nebraska......	40	Big Sioux..............	150
Kansas................	150		

Ohio and Branches.

	Miles.		Miles.
Ohio, proper..........	1,000	Kentucky..............	62
Alleghany	200	Salt River.............	35
Monongahela....	60	Green..................	150
Muskingum	70	Barren..................	30
Kanawha..............	65	Wabash...........	400
Big Sandy.........	50	Cumberland............	400
Scioto....	50	Tennessee	720

Red River and Branches.

	Miles.		Miles.
Red River, proper......	1,500	Tensas....	150
Washita	375	Lake Bistenaw..........	60
Saline..................	100	Lake Coddo............	75
Little Missouri.........	50	Sulphur Fork..........	100
Bayou d'Arbonne......	60	Little River............	65
" Bartholomew...	150	Kiamchi...............	40
" Bœuf..........	150	Boggy..............	40
" Macou.........	175	Bayou Pierre..........	150
" Louis..........	30	Atchafalaya............	360

The lower part of the *M.* is so much flooded after the rainy season that there is often a space of inundated woodland from 30 to 100 m. in width; large swamps and bayous, also, are found during the whole year, on both sides the river; and, indeed, the whole country, nearly as far up as Natchez, 427 m. from its mouth, presents nothing but a swampy wilderness, the habitat of alligators, and subject to epidemic and other diseases most inimical to human life. The lower part of the *M.*, for 30 m. above its delta, as far as the head called Plaquemines, is a reedy marsh, without trees, and containing only a few fishermen's huts, and a residence for pilots at Balize; in fact, nothing can well be conceived more dreary than the aspect of the river, even as far as 70 m. above the mouth. The principal entrances for vessels are the N. E. Pass, lat. 29° 7′ 25″, about 3½ m. S. E. of the light-house on Frank's Island; the S. E., or Main Pass, lat. 29° 8′, 4½ m. S. S. E. of the light; and the S. W. Pass, about 22 m. S. W. of that landmark. On all these passes there are bars at the outlets, with comparatively shallow water; the main pass has about 13 feet, the S. W. pass 12 feet, but the rest are much shallower. The tide rises only from 1½ to 2 feet at Balize, and is not perceptible more than 30 m. above the mouth. The *M.* has 4 other outlets; one, called the Iberville, on the E bank, flowing through the lakes Maurepas and Pontchartrain; the other being on the W. bank, viz., La Fourche, which leaves the main stream 186 m. from its mouth; Plaquemines, about 31 m. higher up; and the Atchafalaya, which deflects S. W. in lat. 31° N., and lon. 91° 42′ 30″ W. The last mentioned branch partly empties into the bay of its own name, but also returns a portion of its waters into the main current, with which, indeed, all the minor branches of the delta are more or less interlaced. The *M*, recipient of all the waters flowing E. from the Rocky Mountains, and W. from the Alleghanies, is subject to periodical inundations, the effect of which is greatly heightened by the flatness of the circumjacent country in the lower part of its course. It is intersected also, in every direction, by numerous natural canals, or *bayous*, which, during the floods, are constantly in motion, and render it impossible to carry on any internal intercourse except by means of boats. The waters, however, which are thus sent down from the colder regions of the W. and N., and the temperate region of the Ohio Valley, are not supplied simultaneously, — the S. rivers sending down their floods early in the year, while the N. keep up their supplies as late as midsummer. Hence the *M.* appears to have two annual floods, the first, in ordinary seasons, beginning with the new year. Few years pass without a swell about this season. This first flood is invariably followed by a depression, previously to the great spring inundation, which begins in April, commencing with the *first* flood of the Missouri in March, on the breaking up of the ice. This is followed by that of the upper *M.*, and afterwards by those of the Ohio, Illinois, and all the other affluents. The *great* flood of the *M.* begins in June. About the middle of the same month the river attains its greatest height at Natchez, about 400 m. from its embouchure; and in the first week of July the flood at New Orleans is generally at its maximum. Considerable variations, however, occur in the periods, as well as extent, of the inundations. The swell of the *M.* during the floods is, near the sea, only 3 feet; at New Orleans, 120 m. from its mouth, 12 feet; at Baton Rouge, 138 m. higher, 25 feet; at Fort Adams, and generally thence to the Ohio, 45 feet; and in the upper *M* the rise is from 18 to 22 feet, the diminution from the mouth being a consequence of the large expanse of the country over which the waters are spread. To secure the land from these inundations, immense embankments, or *levées*, as they are generally called, have been formed along the *M.*, and the canals or bayous through which its waters overflow. The principal of these levées commences at the head of the Island of Orleans, and extends down the stream for about 130 m. The river, however, not unfrequently bursts through this dyke, and submerges the adjoining country. The *M.* differs from most of the other great American rivers in the uniformity of its width and depth for many hundred miles. Indeed, it is navigable at every period of the year considerably above its junction with the Missouri, and for at least 2,000 m. above its mouth. The width of the main river averages about 900 yards below the Ohio; and its medial depth varies from 90 to 120 feet. The current of the lower *M.*, though strong, does not equal that of the Missouri. Its velocity may be ascertained from the progress made by boats descending the stream. When the water is low, a boat will float from 45 to 50 m. a day; when in a middle state, from 60 to 70 m.; and during the freshets, from 90 to 100 m. This, however, applies only to that part of the river above the Arkansas; for, below this a small dilatation occurs, and the swamps also receive a vast body of water, by which means the current becomes less rapid. As soon as the river enters the delta, its rapidity is further slackened through the diffusion of its waters into various subordinate channels. From this point to New Orleans no variation is perceptible; but between the Arkansas and the delta the velocity of the current is diminished nearly a third, and thence to the sea about one half. Outside the bar the current sets to the E.; but there are counter-currents, which in no small degree perplex the mariner on entering or leaving the river. The white waters of the *M.* do not readily mix with the sea, and may be distinguished from 9 to 14 m. from Balize. By far the most dangerous obstruction to the navigation of this river arises from the multitude of large trees precipitated from its banks into the water. These frequently become firmly fixed in the river's bed. Some of them are called *planters* or *snags*, because they are immovable, and constantly expose their pointed shafts above the stream. Others are denominated *sawyers*, from their alternately rising above and falling below the surface. It is dangerous for boats to run against either of these; and the best way of avoiding them is to steer a mid-channel course, where they seldom make their appearance, while for further security the steamers have frequently double bows. The number of trees visible to the eye is greater or less according to the high or low state of the water. But steamers have been fitted up with machinery for removing these obstructions to navigation; and it is believed that in no very lengthened period this impediment will no longer exist, at least in any dangerous degree. The facilities afforded by the *M.* and its various tributaries for internal navigation are wholly unequalled, except, perhaps, by the Amazon and its feeders, in S. America. It is but yesterday, as it were, since the valley of the Mississippi began to be occupied by civilized man and reclaimed from the wilderness; and its astonishing increase in population and wealth is principally ascribable to the facility afforded by this noble river for its intercourse with other parts of the N. American continent and of the world at large. The trade and navigation of the *M.* is now incomparably greater than that of any river in the E. hemisphere. And vast as are its natural capacities for navigation, they have been greatly extended by canals and connection with our wonderful system of railroads. It is also united with the grand chain of lakes and the basin of the St. Lawrence; and goods taken on board at New York may be transported to New Orleans without being unshipped.

Missive, a letter sent by a messenger.

Missouri, one of the Central U. States, is situated between lat. 36° and 40° 36′ N., lon. 89° and 95° 30′ W. It is bounded N. by Iowa; E. by Illinois, Kentucky, and Tennessee; S. by Arkansas; and W. by Indian Territory, Kansas, and Nebraska. It is 277 m. long and 244 m. broad on an average, containing 65,350 sq. m. The State is divided into 114 counties. St. Louis, the commercial metropolis of *M.*, is one of the largest, richest, and most prosperous cities in the U. States (see St. Louis). *Jefferson City*, the capital, is on the Missouri River, 125 m. W. of St. Louis; pop. 5,000. The most important cities besides St. Louis and Jefferson City are Kansas City (pop. 40,000), St. Joseph (25,000), Hannibal (15,000), Springfield (6,500), Sedalia (6,000), Lexington (5,500), and St. Charles (5,000). Total pop. of the State, about 2,250,000.

This State presents a great variety of surface and soil. Alluvial or bottom land is found on the margin of the rivers; receding from them the land rises in some places gently, and in others very abruptly, into elevated barrens or rocky ridges. In the interior, bottoms and barrens, naked hills and prairies, heavy forests and streams of water, may often be

seen at one view, presenting a diversified and beautiful landscape The S E. part of the State has a very extensive tract of low, marshy country, abounding in lakes and liable to inundations. Back of this a hilly country extends as far as the Osage River. The country N. of the Missouri is emphatically "the garden of the West." There is no part of the world where a greater extent of country can be traversed more easily when in its natural state. The surface is for the most part delightfully undulating and variegated, sometimes rising into picturesque hills, then stretching away into a sea of prairies, occasionally interspersed with shady groves and shining streams. The alluvial regions of *M.* include the high and low bottoms, swamp, and cypress lands. The high bottoms have light, deep, porous, silicious soils, and are very productive, being little affected by the wet and dry seasons. These lands are above the ordinary high-water level, and embrace nearly one eighth of the whole area of the State; the low bottoms differ from the high bottoms only in being subject to inundation at the ordinary rises in the rivers, which occur on all the streams, but principally in the S. E. The soils of the swamp localities are very similar in composition to the two preceding classes, yet differ in being so situated as to be overflowed; while the cypress lands are still lower, and are covered with standing water during a portion of the year. These lands are principally in the S. E. The soil is exceedingly rich, supporting a luxuriant growth of vegetation. The greater part of the swamps may be made available for agricultural purposes by an extensive system of drainage; but the cypress swamps are generally valuable only for their superabundant yield of timber The uplands possess a greater variety of soils and surface, and are available for a wider range of agriculture. Some of these lands are very fertile. Considerable portions, particularly in the S. part of the State, are superiorly adapted to fruit-culture, and the grape grows there in perfection. The river-bottoms are richly timbered with oak, elm, ash, hickory, cotton-wood, linden, and black and white walnut. Thinner soils throw out white and live oak, and are occasionally draped with heavy forests of yellow pine, crab-apple, papaw, hazel, and wild vines of spontaneous growth. The State is nearly equally divided between prairie and woodland The prairies exhibit an exuberant growth of excellent, nutritious native grasses, which also exist in the woodlands, and also on the uplands and hilly slopes in the S. part of the State, rendering this section a pre-eminently grazing region. Maize, wheat, oats, and tobacco form the staple productions. In 1879, *M.* produced more Indian corn than any other State except Illinois, Indiana, Ohio, and Iowa; more wine than any other except California; and ranked after Kentucky, Virginia, Tennessee, Ohio, and Maryland in the yield of tobacco The relative value of agricultural products for the year 1879 is given in this work under the names of each of the principal crops The number of acres of land in farms in *M.*, as reported by the last census, was 21,707,220: of which 9,130,615 consisted of improved lands, 8,965,229 of woodland, and 3,611,376 of other unimproved soil; the cash value of farms under cultivation, $392,908,047, exclusive of $15,596,426 of implements and machinery. Total value of farm products, $103,035,759; of orchard stuffs, $2,617,463; of market gardens, $406,655, of lumber, etc., $793,343. Valuable deposits of coal have long been known to exist in *M.*, and their development has added largely to the progress and wealth of the State. The coal-field comprises an area of about 23,100 sq. m., falling in thirty-six counties, principally in the central and W. sections. The extent of these deposits is estimated at 130,000,000,000 tons. There are also other extensive local deposits of cannel and other bituminous coals in several counties outside of the regularly defined coal-fields, which produce some of the best coal in the State. Iron ores of the best quality exist in almost inexhaustible quantities, of which the specular oxide ore is the most abundant. The most extensive deposit of this ore is at Iron Mountain, in Iron Co. It is estimated that this mountain will yield 230,187,375 tons above the valley, and 3,000,000 tons to each foot beneath that surface. This ore also occurs extensively in Dart, Phelps, Pulaski, and other counties. Vast deposits of silicious specular oxide of iron exist in Pilot Knob, about 6 m. E. of Iron Mountain, where it has been mined since 1847. It is 518 feet high, covers an area of 360 acres, and its yield is estimated at 13,972,773 tons above the level of the valley. Shepherd Mountains, 1 m. W. of Pilot Knob, contain vast quantities of pure specular and magnetic oxides Hematite of good quality occurs in large quantities in the magnesian limestone rocks. It also occurs abundantly in the ferruginous sandstone and tertiary rocks, but generally of inferior quality. It abounds, too, in Scott and Stoddard counties, and the counties adjoining Iron Mountain, as well as in several counties in the W. part of the State south of the Missouri; large quantities of bog-ore exist in the swamp districts in the S. E, while spathic ore is found everywhere in the coal-measure rocks; but the most valuable deposits of both these ores are in Scott Co. Among the other important minerals found in this State, lead is perhaps the most abundant and valuable. It occurs in some six hundred localities, embracing 31 counties. The principal lead regions are the counties S W. of St. Louis, in the valley of the Osage, in Jasper and Newton, and in Webster, Christian, and Taney counties, near the S. boundary. The whole area embracing lead deposits in workable quantities includes 6,300 sq. m., while the lead-bearing rocks absorb an area of 15,000 sq. m. Copper is found extensively deposited, being most abundant near La Motte mines. It is also found with nickel, manganese, iron, cobalt, and lead, in combinations yielding from 30 to 40 per cent of ore. Zinc, cobalt, nickel, peroxide of manganese, antimony, saltpetre, etc., are also found in several localities. Building material of all descriptions abounds throughout the State, including vast quantities of the most valuable timber, an extensive variety of sandstone and limestone, and materials for the manufacture of bricks and tiles. There are also several beds of superior marble, of various colors and textures, in different sections of the State, with materials for paints and cements. The climatic character of *M.* is noted for extremes of temperature. In the winter the rivers are often frozen so as to admit the crossing of heavily loaded vehicles, while in summer it is extremely warm, its enervating effects being counteracted by a very dry, pure atmosphere, generally favorable to health and longevity. *M.* stands in the front rank of manufacturing States. Its direct commerce is also very extensive, and its transit trade is immense, a great part of the produce of the Northwest, as well as the supplies for that section, being borne over the Missouri and Mississippi rivers and the numerous railroads of the State. The great commercial centre of all this trade, and also of the manufacturing interests of *M.*, is *St. Louis*, under which name are given the statistics of the foreign trade, and also of the leading articles of manufacture and commerce of the State. St. Louis, St. Joseph, and Kansas City are U. States ports of delivery, belonging to the district of Louisiana. In 1879 *M.* had 22 national banks in operation, whose paid-in capital was $7,175,000. There were, besides, 176 State banks, savings-banks, and private bankers, whose aggregate capital was $4,124,269. The State debt (besides bonds issued to Hannibal and St. Joseph R. R. Co.) amounted to $16,758,000, whose annual charge was $1,005,480. The taxable property, including real, personal, railroad, and bridge property, was valued at $535,946,624; tax per capita, $0 98. The railroad system of *M.*, as that of Illinois, has been developed with wonderful activity. In 1853 this State had only 38 m. of railroad, 817 in 1860, and 925 in 1866; while in 1879 there were 3,286 m. of completed railroad, belonging to 36 companies, as shown in the following table: —

Fig. 354. — Seal of Missouri.

Companies.	Total length of line.	Total length in State.
	Miles.	Miles.
Beaver Branch	4 37	4 37
Boone Co. and Boonesville	22.00	22.00
Brunswick and Chillicothe	36.50	36.50
Burlington and Southwestern	142.34	64.34
Cape Girardeau and State Line	3 75	3.75
Cherry Valley	6.00	6.00
Dent and Phelps	3.90	3.90
Hannibal and St. Joseph	292 35	292.35
Iowa Southern and Missouri Northern	347.43	169.45
Joplin	35.85	17 92
Kansas City and Eastern	43.00	43 00
Kansas City, Fort Scott, and Gulf	159 92	2 22
Kansas City, St. Joseph, and Council Bluffs	250.98	197 89
Little River Valley and Arkansas	27.10	27 10
Louisiana and Missouri River	101 50	101.50
Missouri, Iowa, and Nebraska	85.00	70.21
Missouri, Kansas, and Texas	785 80	283.98
Missouri Pacific	296.50	296 50
Missouri and Western	84.00	55.60
Osage Valley and Southern Kansas	25.00	25 00
Pleasant Hill and De Soto	45 00	21.94
Quincy and Missouri and Pacific	76.00	76 00
St Joseph and Des Moines	23 00	23 00
St. Joseph and St. Louis	76 00	76 00
St. Louis, Council Bluffs, and Omaha	42.00	42 00
St. Louis, Hannibal, and Keokuk	48.60	48 60
St. Louis, Iron Mountain, and Southern	684.50	380 00
St. Louis, Kansas City, and Northern	379 00	379 00
St. Louis, Keokuk, and Northwestern	90.00	90.00
St. Louis and Lexington	55 25	55 25
St Louis, Salem, and Little Rock	41.00	41 00
St. Louis and San Francisco	327.25	292 67
St. Louis Tunnel	0.91	0 91
Salem and Southeastern	1.25	1.25
Springfield and Western Missouri	16.00	16 00
Wabash (Hannibal to Bridge)	......	1.00
West End Narrow Gauge	18.00	18.00

Missouri and Western R.R. runs from Pierce City, Mo., to Oswego, Kansas, 74 m.; branch from Orange to Joplin, 10 m.; total length of road, 84 m. This Co., located at Carthage, Mo., was first chartered as the Memphis, Carthage, and North-western R.R. Co. Capital stock, (common) \$584,000, (preferred) \$500,000; funded debt (consisting of 1st mortgage, due 1907, 6 % interest, issue limited to \$1,100,000), \$263,000; other liabilities, \$839,298. Cost of road and equipment, \$2,304,549.

Missouri, Iowa, and Nebraska R. R., from Alexandria, Mo., to Nebraska City, Iowa, 300 m.; of which 85 m., from Alexandria to Centreville, are in operation. This Co., whose offices are in Alexandria, was chartered in 1870. Capital stock authorized, \$16,000,000; paid in, \$1,457,225; funded debt, bonds payable in 1910, 7 % interest, payable June and Dec., \$1,800,000.

Missouri, Kansas, and Texas R. R. runs from Hannibal, Mo., to Denison, Tex., 576 m.; branches from Parsons to Junction City, Kansas, 156 m.; and from Holden to Paola, 53.80 m.; total length of road, 785.80 m. This Co., located at Sedalia, Mo., has received considerable land-grants. It is a consolidation, in 1870, of the Union Pacific (Southern Branch), the Tebo and Neosho, the Labette and Sedalia, and the Neosho Valley and Holden. The St. Louis and Santa Fé R.R. was purchased at foreclosure sale in 1872; and the Hannibal and Central Missouri R.R. was purchased in 1874. The road was placed in the hands of a receiver on Dec. 30, 1876, after default on the interest of the consolidated bonds, and on July 1, 1876, the Union Trust Co., of New York, took possession of the road, and has since managed it. Cap. stock, \$21,405,000; preferred stock (balance not surrendered), \$60,209.70; funded debt, \$18,632,000; new 2d mortgage income bonds, \$6,804,720.99. Total stock and bonds (floating liabilities not included), \$40,988,845.77.

Missouri Pacific R.R. runs from St. Louis to state line of Kansas, 283 m.; branches from Kirkwood to Carondelet, Mo., 13 m.; lines leased, 127 m.; total length of lines operated, 423 m. This Co., whose principal office is at St. Louis, was created on Oct. 3, 1876, to succeed the Pacific R.R. of Mo., which was sold under foreclosure of the 3d mortgage, on Sept. 6 of the same year. Capital stock (common), \$800,000; funded debt, \$15,823,000.

Missouri River, the principal tributary of the Mississippi, rises in two branches, which collect all the water flowing from the Rocky Mountains between 42° and 48° N. lat. The most N. of these sources, or the *M. proper*, rises in about lat. 45° N., and lon. 110° 30′ W., taking an E. course, inclining to the N. for about 620 m.; receiving in its flow many considerable affluents, and having a stupendous fall of 170 feet about 300 m. from its source. The other branch, called the *Yellowstone River*, rises by several heads between lat. 42° and 44° N., and after a N. N. E. course of more than 900 m., joins the *M.* proper in lat. 48° 10′, and lon. 104° W., where its stream is 860 yards wide. The united river flows hence through a fine open prairie, and after reaching its utmost N. bend, in lat. 48° 30′, curves S. past Fort Mandan, maintaining the same course to the confluence of White River, in lat. 43° N., below which it takes a general S. S. E. course, by Council Bluffs, to the junction of the Kansas, and then runs nearly E. to its union with the Mississippi; its entire length from the source of the Yellowstone to this point being 3,130 m.

The largest tributaries of the *M.* are the Platte, Kansas, and Osage, all rising on the E. offsets of the Rocky Mountains, and joining the *M.* on its W. bank; the E. affluents, except the Grand River and Chariton, are quite inconsiderable. The navigation of the *M.*, from the Mississippi to the Falls, a distance of 2,575 m., may be generally deemed good, though the season be short, and the steamers run only during daylight. The main difficulties of navigation arise from its falling banks, the timber imbedded in the mud of its channel, its sand-bars and rapids, and the rapidity of its current, which ranges from 5 to 8 m. an hour. All these may be overcome by using the necessary precautions; but the Falls entirely interrupt the navigation, and a portage becomes necessary at the point where, for about 2¾ m., the *M.* rushes down a succession of tremendous cataracts and rapids. Above the Falls the current is frequently impeded by shoals and rapids; and as the river issues from the Rocky Mountains, its banks are shut in on both sides for more than 5 m. by rocks rising perpendicularly from the water's edge to the height of nearly 1,200 feet. The most important places on the banks of the *M.* are Fort Benton, in Montana; Yankton, in Dakota; Sioux City and Council Bluffs, in Iowa; Omaha, in Nebraska; Atchison and Leavenworth, in Kansas; and St. Joseph, Kansas City, Lexington, Booneville, Jefferson City, and St. Charles, in Missouri.

Misteca, Mestique, a local name for the cochineal insect in Mexico.

Mite, a division of the troy-grain, used by moneyers, equal to the 20th part of a grain, and divided into 24 doits.

Miter, Mitre, an angle of 45 degrees; a joint consisting of two boards framed together, matched, and united upon a line which bisects the angle of junction.

Miter-Gauge, a gauge for determining the angle of a miter-joint in picture-frames, mouldings, etc.

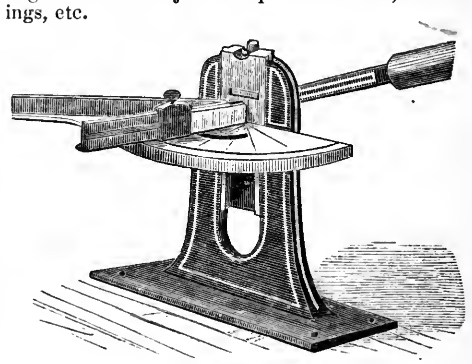

Fig. 355. — Mitering-Machine.

Mitering-Machine, a machine (Fig. 355) used by printers for mitering rules, that is to say, making their ends meet at a miter-joint. There are several American patents.

Miter-Joints. See Miter.

Miter-Plane, a plane used by joiners to make a draw-cut, the bit being set obliquely across the face of the stock.

Miter-Wheel, a term applied to wheels that have their teeth set at 45° within the spindle, so as to transmit the motion to another miter-wheel and shaft placed at right angles to the first wheel.

Mitrailleur, a machine-gun or battery-gun which sends a large number of small projectiles, independently and with precision, to a considerable distance. The name originated with the French *mitrailleuse*, which was first used during the Franco-German war, but is now applied to some other breech-loaded guns, of which the American Gatling battery-gun is the best example.

The Gatling battery-gun (Fig 356) is made of three sizes, the largest one firing bullets 1 inch in diameter, weighing ½ lb., the smallest discharging bullets of 45 in. diameter. The small Gatling is effective at a range of more than 1½ m., and can discharge 400 bullets or more in one minute. The gun consists

of a series of barrels in combination with a grooved carrier and locked cylinder. All these several parts are rigidly secured upon a main shaft. There are as many grooves in the carrier, and as many holes in the lock cylinder, as there are barrels. Each barrel is furnished with one lock, so that a gun with ten barrels has ten locks. The locks work in the holes formed in the lock cylinder on a line with the axis of the barrels. The lock cylinder, which contains the lock, is surrounded by a casing, which is fastened to a frame, to which trimmers are attached. There is a partition in the casing, through which there is an opening, and into which the main shaft, which carries the lock cylinder, carrier, and barrels, is journalled. The main shaft is also at its front end journalled in the front part of the frame. In front of the partition in the casing is placed a cam, provided with spiral surfaces or inclined planes. This cam is rigidly fastened to the casing, and is used to impart a reciprocating motion to the locks when the gun is rotated. There is also in the front part of the casing a cocking ring which surrounds the lock cylinder, is attached to the casing, and has on its rear surface an inclined plane with an abrupt shoulder. This ring and its projection are used for cocking and firing the gun. This ring, the spiral cam, and the locks make up the loading and firing

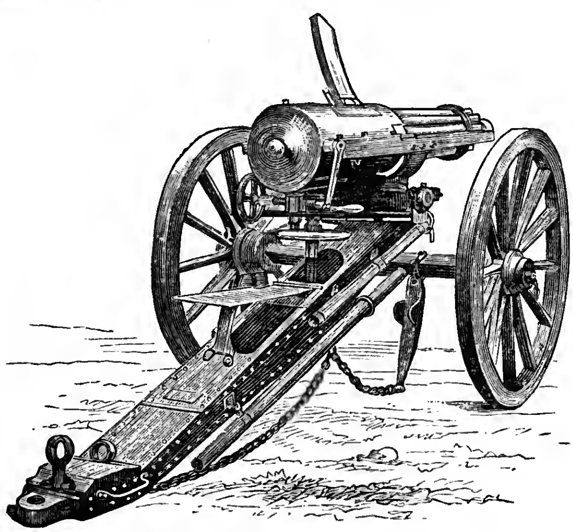

Fig. 356. — The Gatling Battery-Gun.

mechanism. On the rear end of the main shaft, in rear of the partition in the casing, is located a gear-wheel, which works to a pinion on the crank-shaft. The rear of the casing is closed by the cascabel plate. There is hinged to the frame in front of the breech-casing a curved plate, covering partially the grooved carrier, into which is formed a hopper or opening, through which the cartridges are fed to the gun from feed-cases. The operation of the gun is very simple. One man places a feed-case filled with cartridges into the hopper; another man turns the crank, which, by the agency of the gearing, revolves the main shaft, carrying with it the lock cylinder, carrier, barrels, and locks. As the gun is rotated, the cartridges, one by one, drop into the grooves of the carrier from the feed-cases, and instantly the lock, by its impingement on the spiral cam surfaces, moves forward to load the cartridge, and when the but-end of the lock gets on the highest projection of the cam, the charge is fired, through the agency of the cocking device, which at this point liberates the lock, spring, and hammer, and explodes the cartridge As soon as the charge is fired, the lock, as the gun is revolved, is drawn back by the agency of the spiral surface in the cam acting on a lug of the lock, bringing with it the shell of the cartridge after it has been fired, which is dropped on the ground Thus, it will be seen, when the gun is rotated the locks in rapid succession move forward the load and fire, and return to extract the cartridge-shells. In other words, the whole operation of loading, closing the breech, discharging, and expelling the empty cartridge-shells is conducted while the barrels are kept in continuous revolving movement It must be borne in mind that while the locks revolve with the barrels, they have also, in their line of travel, a spiral reciprocating movement; that is, each lock revolves once and moves forward and back at each revolution of the gun. The small Gatling is supplied with another improvement called the "drum feed" This case is divided into 16 sections, each of which contains 25 cartridges, and is placed on a vertical axis on the top of the gun As fast as one section is discharged it rotates, and brings another section over the feed aperture, until the whole 400 charges are expended.

Whatever may be the part this new weapon is destined to play in the wars of the future, we know that every European power has now provided itself with some machine guns. The Germans have those they took from the French, who adhere to their old pattern. The Russians have made numbers of Gatlings, each of which can send out, it is said, 1,000 shots per minute, and improvements have been effected, so as to obtain a lateral sweep for the fire. There is also the *Montigny* or Belgian mitrailleur, whose 37 barrels can be discharged at any required rate

Mitre. See Miter.

Mittens, Mitts, thin ladies' gloves without fingers, of silk, net, or lace; men's warm wrappers for the hands, made of cloth, worsted, etc., differing from gloves in having no separate divisions for the fingers.

Mix, to mingle.

Mixed Fabrics. Besides the various goods in cotton, flax, silk, and wool, ingenuity is always at work in devising combinations of two or more of them; and these constitute *mixed* fabrics. The technical names *vestings, coatings, tweeds, linings, cravatings, plaids, tabinets, poplins, paramattas, cashmerettes, cassinets, challis, bareges, cashmeres, shawl-cloths*, are only a few among those applied to mixed goods. It is almost like a sum in permutation to determine the number of ways in which a certain number of materials may be combined; and the manufacturers are ever on the lookout for new combinations. Besides the four well-known kinds of fibre above mentioned, there have been added three others to the list in recent times, — *alpaca* and *mohair* for fine goods, and *jute* for coarse, — insomuch that seven elements now enter into the permutation. Sometimes the warp, sometimes the weft, sometimes a nap or pile at the surface, is the point most attended to; in some cases yarns are dyed before weaving, in others the cloth is printed after weaving; in some the Jacquard loom is employed to give a pattern to diversely colored threads.

Mixture, a mass or compound consisting of different ingredients blended without order. — Any liquid form of medicine taken internally, whether merely a collection of fluids, or containing substances which have to be first triturated or brayed in a mortar.

Mizzen, or **Mizzen-Mast**, the aftermost mast of a ship.

Moating-Machine, an apparatus used in the woollen districts to remove the moats or burrs (that is to say, the seeds or parts of grasses which adhere to the fleece).

Mobile, the largest city, port of entry, and only seaport of the State of Alabama, is situated on the W. side of a river of the same name, at its entrance into Mobile Bay, 200 m. S. W. of Montgomery, 217 m. S. by W. of Tuscaloosa, 170 m. E. N. E. of New Orleans, and 55 m. W. by N. of Pensacola, in lat. 30° 41′ 26″ N., lon. 88° 1′ 29″ W., on a beautiful and extended plain, elevated 15 feet above the highest tides, open to refreshing breezes from the bay. Pop. 35,000.

The entrance to Mobile Bay is between Mobile Point on the E and Dauphin Island on the W., about 3¼ m. apart, the deepest channel having 15 feet water at low ebb; but vessels drawing more than 8 or 9 feet water cannot, owing to a shoal in the bay, reach the town except at high water A light-house erected on Mobile Point exhibits a fine light elevated 55 feet above the level of the sea. The trade of Mobile has been much hindered by the shallowness of its harbor, which, however, has

been of late so much improved that vessels drawing 13 feet water can now reach the wharves. Mobile is, next to New Orleans, the greatest cotton mart of the South. The total exports from Mobile, for the year 1879, amounted to $6,219,818, of which $5,975,343 consisted of cotton (123,214 bales); the total imports were valued at $544,628, in which coffee entered for $495,030. During the same year 122 vessels entered from foreign ports, with an aggregate tonnage of 56,166; and 131 vessels (tonnage, 57,518) cleared to foreign ports. The coastwise entrances were 84 (tonnage, 15,981), clearances 54 (tonnage, 15,652). At the end of the fiscal year 1879, 109 vessels of 14,454 tons belonged to the port, of which 65 (tonnage, 7,328) were sailing vessels, 40 (tonnage, 6,667) steamers, and 4 (tonnage, 458) barges. Steamers ply regularly between Mobile, Montgomery, and other points on the rivers of the State. There is also a direct line of steamers between Mobile and Liverpool, belonging to the Gulf City Steamship Co., the first steamer of which entered the port on Dec. 19, 1879. The trade of Mobile in naval stores and lumber produced in the vicinity is very important. The city has 2 national banks, with a paid-up capital of $800,000; 2 State banks, capital, $1,000,000, and 2 savings-banks. Four lines of railroad afford communication with all parts of the country, viz., the Alabama Grand Trunk, Mobile and Montgomery, Mobile and Ohio, and New Orleans, Mobile, and Texas.

Mobile and Girard R.R. runs from Columbus, Ga., to Troy, Ala., 84 m. The Co., located in Columbus, was chartered in 1853, and the road was opened in 1876. Capital stock, common, $986,864.80; preferred, $279,745.84; funded debt, $1,133,500. Cost of construction, $1,715,439.87.

Mobile and Montgomery Railway runs from Montgomery to Mobile, Ala., 178.80 m. The Mobile and Montgomery R.R. Co., consolidation in 1868 of the Alabama and Florida, and the Mobile and Great Northern, made default on 1st mortgage coupons in 1873. The road was sold in foreclosure, Nov. 16, 1874, purchased by bondholders, and organized on the 26th of the same month under its present name. Capital stock, $3,022,517.71; funded debt, $275,000. Cost of construction and equipment, $3,723,694.96. The principal office of the Co. is at Montgomery.

Mobile and Ohio R.R. runs from Mobile, Ala., to Columbus, Ky., 472 m.; branches, 56.6 m.; total length of road, 526.6 m. This Co. was chartered in 1848, and by act of Congress of Sept. 20, 1850, it was endowed with a land-grant amounting to 1,181,431 acres. The road was opened in 1859, and on general default made on May 1, 1874, the property passed into the hands of two trustees and receivers. Capital stock, $5,320,000; funded debt, $15,484,250.86. Cost of road and equipment, $18,126,865.37. The principal office of the Co. is at Mobile.

Moccasins, rough deer-skin sandals, the sole and upper of which are formed of one piece of leather.

Mocha, Mokha, the principal port in the Red Sea frequented by Europeans, in that part of Arabia called Yemen, about 40 m. N. of the Strait of Bab-el-mandeb, lat. 13° 19′ 30″ N., lon. 43° 20′ E. It is encircled with walls, and indifferently fortified. Its appearance from the sea is imposing. It has greatly declined since the British occupation of Aden. Pop. 6,000.

M. is situated on the margin of a dry, sandy plain. It is built close to the shore, between 2 points of land which project and form a bay. Vessels drawing from 10 to 12 feet water may anchor within this bay at about a mile from the town; but large ships anchor without the bay in the roads, in 5 or 7 fathoms water, — the grand mosque bearing E. S. E., and the fort to the south of the town S. by E., distant about 2 m. from the shore. The great article of export from *M.* is coffee, which is universally admitted to be of the finest quality. The quantity exported may be taken at 10,000 tons, or perhaps more. The greater portion is sent to Djidda and Suez; but there is a pretty large export to Bombay and other parts of India, whence some is sent to Europe: occasionally, however, the exports from *M.* and Hodeida, direct to Europe, are very considerable. Besides coffee, the principal articles of export are dates, adjoue, or paste made of dates, myrrh, gum-arabic, olibanum, senna (*Cassia senna*), sharks' fins, tragacanth, horns and hides of the rhinoceros, balm of Gilead, ivory, gold-dust, civet, aloes, sagapenum, etc. The principal articles of import are rice, piece-goods, iron, hardware, etc. The ivory, gold-dust, and civet met with at *M.* are brought from the opposite coast of Abyssinia. The greater part of the foreign trade of *M.* is transacted by the Banians; and it is much safer to deal with them than with either Turks or Arabs. Europeans pay a duty of 3 per cent ad valorem on all goods imported by them; the duty being levied on the amount of the sales. The buyer pays brokerage, cooley, and boat hire. All kinds of foreign goods are sold on credit, and the payment is made in 3 instalments, or at a certain day, according as may have been agreed on. Coffee is always paid for in ready money. On the sale of other goods, the produce of the country, a credit is given; or if ready money be paid, a discount is allowed at the rate of 9 per cent.

Mocha Stone, a semi-transparent chalcedony, including various ramified forms produced by iron, or other mineral substances, but sometimes also by the presence of vegetable bodies, such as mosses. The finest are found in Arabia, but receive their name from having first been brought from Mocha.

Mock Auctions, sales, or pretended sales by outcry, by an auctioneer or professed auctioneer, where misrepresentations and frauds are practised upon the buyer. The auctioneer is usually aided by two, three, or more confederates, who act as bidders, and who are called *peter funks*. The victims are mostly people from the country who are unacquainted with city life. — *T. McElrath.*

The law of the State of New York on mock auctions is as follows: "Whereas a failure of justice frequently arises from the subtle distinctions between larceny and fraud; and whereas, certain evil-disposed persons, especially in the city of New York, have for several years past, by means of certain fraudulent and deceitful practices known as mock auctions, most fraudulently obtained great sums of money from unwary persons: Each and every person who shall, through or by means of the afore recited deceitful and fraudulent practices, etc., obtain from any other person any money, shall, on conviction, be punished by imprisonment in the State prison for not more than three years, and by a fine not exceeding one thousand dollars."

Mock-Jewelry, showy ornaments made of thinly gilt brass, and usually set with glass imitations of precious stones.

Modehandlung [Ger.], a fancy trade; a milliner's store.

Model, a miniature plan of anything, an original pattern to work from; a specimen. — A person who stands to a sculptor or painter.

Imp. duty: Models of invention or improvement in the arts (but no article shall be deemed a model, or improvement, which can be fitted for use), free. All other models, according to material.

Modeller, a designer; a moulder in wax, clay, or plaster; a sculptor in stone; a constructor of models in ships, buildings, etc.

Modelling, the art of forming a design in clay, or of making a mould from which works in plaster are to be cast. *M.* is essentially a practical art, and depends greatly upon the experience and artistic skill of the modeller.

M. is mostly executed with the fingers; and the tools employed are generally made of wood and wire, and so constructed as to be able to do what the fingers cannot perform. As wire tools can be fashioned into loops of various sizes and shapes, they are the most useful, and accomplish any required form without moving the clay on to any already finished part, the superfluous clay remaining in its place while the wire passes under it. Wire tools are most effective in working upon concave surfaces, such as the narrow folds of draperies. The wooden tools employed are of various shapes, and are composed of box and ebony. The wooden tools used in fine modelling are usually kept steeped in oil, as by that means the clay is less liable to adhere to them. Common potters' clay of the best quality is the clay used in modelling. It ought to be so wet as to be able to stand in a mass much higher than its own width without support, as it is then much more easily and quickly worked. The support of a figure in

modelling is of great importance; the main parts of the trunk and limbs are built up on supports of wood-work; the arms, when not covered with drapery, may be made of twisted thick copper wire, with small pieces of wood twisted in with it at short intervals, like the tufts in the tail of a kite. The whole model, indeed, should be built up on a complete skeleton of supports. Very little support is required in modelling a bust. The preservation of the uniform moisture of the clay is another essential part of modelling; it should never be allowed to dry, and while the modeller is at work, and the figure exposed, especially in warm weather, it should be frequently sprinkled with water. A plasterer's brush is best adapted for this purpose, and superior to a syringe. After the model is complete, the cast is taken from which the marble is sculptured or other casts made. The whole model, while wet, must be covered with three or four masses, or more, if necessary, of plaster of Paris. When fixed and dry, the whole may be separated at the joints; and when the component parts are placed again together, the place of the original model is filled with plaster of Paris; and when the cast is well set, the mould can be carefully broken off in fragments. The cast is then exposed complete and finished. The ancient sculptors baked their clay models; but clay shrinks and cracks in drying: this plan is not so good as making plaster casts from the models. In making small models for bronzes, the ancients used wax, which is still the modelling material used by goldsmiths and medallists. It is prepared by melting virgin wax with a small quantity of Venice turpentine and flake-white in fine powder. When colored wax is required, a color in fine powder must be substituted for flake-white. The tools employed are made of wood and ivory, and are similar in shape to those used in modelling in clay.

Model Mapping, a mode of showing the features of a district or country by accurate representation on a raised surface, of the elevations, depressions, etc., in relief.

Moderator Lamp. See CARCEL LAMP.

Modillons, small inverted consoles forming ornaments in a cornice to support the larmier.

Modiste [Fr.], a female milliner.

Mogadore. See MOROCCO.

Mohair, the commercial name for the long hair of the Angora goat. The goats, after completing their first year, are clipped annually in April and May, and yield progressively from one to about four pounds' weight of hair. That of the female is considered to be of more value than that of the male, but both are mixed together for the market. *M.* is extensively spun and manufactured in France, in England (chiefly at Bradford), and in Scotland. A large variety of articles is made from *M.;* among others, many kinds of camlets, which exhibit great beauty and brilliance of surface. It is manufactured into plush, and is also used for coach and decorative laces, for buttons, braidings, and other trimmings for gentlemen's coats. It is, moreover, made up into a light and fashionable cloth, suitable for overcoats, etc. In about 1855 the French brought out a texture for ladies' dresses in checks and stripes, which they called *poil de chèvre.* The warp is a fine spun silk, colored, and the weft Angora or Syrian white wool, which was thus thrown on the surface. This article has a soft feel, and looks pretty, but in wearing is apt to cut. It is now superseded by alpaca cloth and other similar materials.

Imp. duty: See TWIST and WORSTED.

Mohur, an East Indian gold coin, equal to 15 rupees: as it contains 165.92 grains pure gold, and 15.08 grains alloy, it is worth intrinsically $7.30.

Moidore, a Portuguese gold coin, worth about $6.75. It contains 48 testaos, of 100 reis.

Moiety, the half of anything.

Moio, MOYO, a Portuguese grain-measure of $2\frac{3}{4}$ quarters; also a wine measure in Spain, of 56.827 gallons.

Moiré [Fr.], a term applied to a variety of manufactured textile goods. The production of this watered effect is usually called *moiré antique*, and is principally used in making the broad silk for ladies' dresses. It is a superior kind of *watering*, and the different modes by which it is effected are kept secret by the *moireurs*, or calenderers. The effect is not produced during the spinning, weaving, or dyeing, but by passing the fabric through cylinders, hot or cold, embossed or plain, and, sprinkling the silk with water or not, by folding layers of silk over each, either rectangularly or diagonally, and other methods by which various degrees of moire can be produced. Certain threads, either of the warp or weft, which happen to receive most pressure, have the most gloss; some are flattened, and the reflection from their surfaces becomes more or less glossy, according to the angle from which it is viewed. This produces the brilliant play of light and shade called *moiré*, or *watering.*

Moiré Métallique [Fr.] is a very pretty example of the crystallization of a thin film. When an acid attacks a surface of pure tin, the surface becomes beautifully mottled by the crystallizing of a thin pellicle of the metal. A piece of tin plate (sheet-iron coated with tin) is well cleansed by washing in potash water, then rinsed and dried. The clean plate is made warm, washed with a solution of nitric and hydrochloric acids, then dipped in water, washed, and dried. Very soon distinct crystals of tin appear on the plate, large or small, according to different modes of applying the acid. The plate is finished with a coating of transparent and slightly colored varnish. Various articles of ornamental manufacture, made of tin prepared in this way, present a very pleasing appearance, having something of the *moiré* or watered effect noticed in the last article.

Molasses [Fr. *melasse;* Ger. *Syrup;* It. *mielazzo di zucchero;* Port. *melasso, assucar liquido;* Sp. *miel de azucar, chancaca*], the uncrystallizable part of the juice of the sugar-cane, separated from the sugar during its manufacture; also, the inspissated juice of sorghum and sap of the maple. Concentrated *M.*, brought by the process of manufacture to the point of crystallization, is considered by the U. States revenue regulations as an inferior sugar. The sirup which remains in the conversion of brown into refined sugar, called *sugar-house M.*, contains too little cane sugar to repay its further treatment. *M.* is of a brown or black color, thick, and viscid; has a peculiar odor, and a sweet empyreumatic taste. The best quality of *M.* is from the sugar plantations of Louisiana, and is known in commerce as New Orleans *M.* After it comes the Porto Rico and the Cuba. For the year 1878, for instance, the average prices of *M.* (per 100 gallons) were as follows: New Orleans, $41.50; Porto Rico, $35.90; Cuba, Muscovado, $33.35; English Island, $32.83; French Island, $31.75.—The products of cane *M.* in the U. States are limited to the Southern States, while the cultivation of sorghum is general throughout the country. Besides our home products, cane *M.* is annually largely imported, shipped in hogsheads containing from 120 to 140 gallons. In former years distillers were large purchasers of foreign *M.*, but latterly this interest has almost wholly neglected the article, and substituted with profit the cheaper residuums of the sugar-house. *M.* is extensively used in the manufacture of certain kinds of tobacco, and sometimes in preparing the coarser sort of preserves. The following statistics show the foreign trade of the U. States in *M.*, and the home produce of cane, sorghum, and maple *M.* See also SUGAR.

Imports and Exports of Foreign Cane M. for the 10 *years from* 1870 *to* 1879.

Years.	Imports.	Exports.	Difference.
	Gallons.	Gallons.	Gallons.
1870..........	56,373,537	1,606,272	54,767,265
1871..........	44,401,359	1,002,184	43,399,175
1872..........	45,214,403	310,588	44,903,815
1873..........	43,533.909	558,289	42,975.620
1874..........	47,189,837	958,280	46,231,557
1875..........	49,112,255	648,488	48,463,767
1876..........	39,026,200	1,058,815	37,967,385
1877..........	30,188,963	302,891	29,886,072
1878..........	27,490,007	589,813	26,900,194
1879..........	38,365,573	734,706	37,630,867

Production, Exports, and Consumption of Domestic M. for the 10 *years from* 1870 *to* 1879.

Years.	Sorghum.	Maple.	Cane.		
	Produce.	Produce.	Produce.	Exports.	Consumed.
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
1870	18,750,000	921,057	6,961,706	299,672	6,662,034
1871	17,000,000	1,421,000	11,821,501	2,946,113	8,875,398
1872	16,000,000	1,547.000	10,283,428	2,726,858	7,556,570
1873	15,000,000	1,632,000	8,774,254	3.055,836	5,718,418
1874	16,000,000	1,678,920	7,226,876	2,447,905	4,778.973
1875	15,000,000	2,022,756	9,415,328	4,769,292	4,646,036
1876	14,000,000	2,146,281	11,439,264	4,408,412	7,030,852
1877	13,000,000	2,000,000	13,347,079	3,470,827	9,876,252
1878	....	....	....	....	....
1879	....	....	....	....	....

Statement showing the Foreign M. imported, and Domestic M. exported, for the year 1879.

Countries.	Imports.		Exports. (Domestic.)	
	Gallons.	Dollars.	Gallons.	Dollars.
Danish West Indies	551,244	107,879		
British West Indies	2,021,746	406,110		
Cuba..............	29,941,203	5,349,122		
Porto Rico........	5,052,010	1,159,869	103,381	20,676
Germany..........			735,972	200,614
Great Britain......			3,794,760	656,456
Sweden & Norway.			53,318	17,125
All other countries.	799,372	165,408	39,936	14,302
Total....	38,365,575	7,188,388	4,727,367	919,173

Imp. duty: 5 cts. per gallon. Concentrated *M.* See SUGAR (SIRUP OF).

Mold, MOULD, the matrix in which anything is cast and receives its form. — The model or pattern which serves as a guide in working mouldings, ornaments, mechanical models, etc See MOULD.

Mole, a mound, embankment, or pier, constructed of solid masonry laid in the sea at the entrance to a port, which it serves to defend from the force of the waves; also, frequently the port or haven thus formed.

Mole-skin, a substitute for low woollen cloths, a strong twilled fustian.

Molleton [Fr.], swan-skin; a kind of blanket or flannel.

Moluccas, or **Spice Islands**, a group of the Malay Archipelago, belonging to the Dutch, and including several hundred islands, many of which are small and uninhabited, scattered between lat. 3° N. and 9° S., lon. 122° and 133° E.; area 42,946 sq. m. The principal islands are Amboyna (the seat of the Governor General), Banda, Ceram, Ternate, Timor Laut, and Tidore. They are generally mountainous and very fertile; owing to the regular monsoons, the heat is never excessive. There are many excellent harbors, but sand-banks which render navigation intricate and dangerous are frequently formed by earthquakes. They are chiefly remarkable for the production of cloves and nutmegs, which are largely exported. Pop. 333,678, of which 1,803 are Europeans.

Monesia Bark, a medicinal Brazilian bark, the produce of *Chrysophyllum buranheim.*

Money, the legalized circulating medium or currency of a country, whether of coins, circulating notes, or any other commodity. Various articles have, in different states of civilization, been used to perform the functions of *M.*, — as cattle, salt, furs, tobacco, silk, cowry shells, and some others; but in almost all parts of the globe these are now superseded by silver and gold, owing to their greater portability, divisibility, and indestructibility, and to their being less liable than almost any other commodities to fluctuations of value. In early ages the denominations of *M.* were identical with those of weight, and the metals were circulated in ingots or small masses. But as civilization advanced, and transactions increased, the constant trouble of weighing them, and, in most instances, of also assaying them, produced a degree of inconvenience that led to the introduction of small pieces, impressed with national stamp, which rendered both operations unnecessary. These, under the name of *coins*, became thus in general use in transactions between individuals belonging to the same political community; though silver and gold, in their former state of ingots or bars, have continued to be employed, in a greater or less degree, in international exchanges. — Some States, in their coinage, have made use of one metal only as standard *M.*, or *legal tender*, to any amount; others, of both gold and silver. In the U. States gold and silver are now legal tenders to any amount. — Of the precious metals, gold, from its superior portability, has been always preferred for large payments and foreign remittances. But in the progress of society it became gradually apparent that the advantages of metallic *M.* were chiefly confined to its functions as a standard and equivalent of value; as a medium of exchange, its weight, the cost of counting large sums, and the risk of losing while removing what has so great an intrinsic value, rendered it unfit for the extended operations of modern commerce. These inconveniences led, in the 14th century, to the introduction of bills of exchange; and, at a later period, to that modification of these instruments which has obtained the name of *paper-M.* The substitution of a cheap for an expensive medium of circulation, by this "coining of credit," is often pointed out as the chief advantage of paper-*M.*; but this is a narrow view of its conveniences. Metallic *M.* would not, even supposing its quantity unlimited, suffice for carrying on so much perhaps as a hundredth part of the transactions that take place in the U. States alone; while, in the greater part of those between distant places, the inconvenience and cost of transporting it from place to place would be so great, that direct exchange or barter would be found the preferable mode of proceeding. — The rate at which *M.* exchanges for other articles is determined by its quantity. If we suppose that all the goods of the country are on one side, all the *M.* on the other, and that they are exchanged at once against one another, it is obvious that one tenth or one hundredth, or any other part of the goods, will exchange against one tenth, or any part of the whole of the *M.*; and that this tenth will be a great quantity or small exactly in proportion as the whole quantity of the *M.* in the country is great or small. The quantity of *M.*, however, is to be estimated, not merely by its proportion to the amount of trade or of payments, but also by the relative rapidity of its cir-

culation, and after allowing for the extent to which its use is economized. Supposing the amount of trade and mode of circulation to remain stationary, if the quantity of *M.* be increased, its value will fall, and the price of other commodities will proportionally rise, as the latter will then exchange against a greater amount of *M.*; if, on the other hand, the quantity of *M.* be reduced, its value will be raised, and prices in a corresponding degree diminished, as commodities will then have to be exchanged for a less amount of *M.* The converse of these changes will take place if the variations occur in the amount of trade and mode of circulation, and the quantity of *M.* remain stationary. In whatever degree, therefore, the quantity of *M.* is increased or diminished, other things remaining the same, in that same proportion the value of the whole and of every part is reciprocally diminished or increased. Gold and silver, however, as products of industry, possess an intrinsic value, like all other commodities, equivalent to the cost of producing them; and hence, in the case of metallic *M.*, if its value in any country be reduced below the level of other countries, it will be used or exported as bullion; while, on the other hand, if its value be increased above that level, it will become an object to import bullion to convert it into coin. The value of metallic *M.* in any country can thus be for only a short time above or below its level in other countries, or its cost of production. A mixed currency, composed of coin, and paper convertible into coin, is obviously regulated by the same laws. But such is not the case with an inconvertible paper-*M.*; for, though under equal limitations as to quantity, it may, *when constituted legal tender*, be preserved of the same exchangeable value as metallic *M.*; yet, wanting intrinsic value, it will not circulate in foreign countries; and hence, when issued in excess, it will become proportionally depreciated; and this depreciation (which will be measured by the rate at which the paper exchanges against bullion) may, by continued additions, go on increasing, until its value as a medium of exchange is entirely dissipated. But although fluctuations in the value of a metallic or mixed currency, owing to variations in quantity, are subject to correction from the influence of the currencies of other countries, the case is different when any diminution is made on the weight of the coin. In this case, though preserving the same name, it will become permanently degraded; and if reduced one half, will as certainly be lowered in real value to the same extent, as a quarter of wheat would be by being reduced to four bushels. In ancient times, owing partly to erroneous conceptions of the nature of *M.*, but chiefly to the injustice of sovereigns, who were thereby enabled to fulfil, in appearance, their engagements with a smaller quantity of gold and silver than would otherwise have been requisite, the degradation of the coin was a common act of public policy. Such an expedient is now almost unknown in civilized communities; but a similar effect may be produced by fraudulent paring or by abrasion. When a seignorage is exacted higher than the expense of coinage, the intrinsic value of the coin will of course be less than its nominal value, but such coins can be used only, like our nickel or copper coins, as a subordinate species of *M.* for small payments, and under certain limitatations as to quantity. — In common mercantile language, the party who exchanges *M.* for a commodity is said to buy; the party who exchanges a commodity for *M.* is said to sell. Price, unless when the contrary is distinctly mentioned, always means the value of a commodity estimated or rated in *M.* — The earliest coinage in this country was in Massachusetts, in 1652, and consisted of 12 pence, 6 pence, and 3 pence (Fig. 357), stamped on one side with N. E., and on the other side with xii *d.*, vi *d.*, and iii *d.*, according to the value of each piece. The mint of the U. States was established by act of Congress, April 2, 1792. The denominations of coin and their rates were as follows: Gold, the eagle of $10, to weigh 270 grs., the half-eagle and the quarter-eagle in proportion, all of the fineness of 22 carats, or 916⅔ thousandths; silver, the dollar of 100 cents, to weigh 416 grs., the half-dollar, quarter-dollar, dime of 10 cents, and half-dime in proportion, the fineness to be 1,485 parts fine in 1,664, or 892.4 thousandths; copper, the cent of 264 grs., the half-cent in proportion. The same act declared the dollar to be the unit of

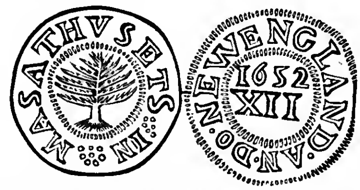

Fig. 357. — First Money Coined in the United States.

federal *M.* Changes in the fineness and weight of gold and silver coins occurred at different times, for which see Eagle, Dollar, Dime, and Copper Coinage. Gold and silver coins (except the three-cent piece) were a legal tender from the establishment of the mint; but at the ratio of 16 to 1 silver was undervalued in the U. States as compared with Europe, and American silver coins were largely exported. An act of Congress of Feb. 21, 1853, provided for a remedy by establishing a seignorage upon the silver divisions of the dollar, the weight of the half-dollar being reduced from 206¼ grs. to 192 grs., and the smaller coins in proportion, and declaring the gold coins and the silver dollar (whose weight continued at 412½ grs., as reduced in 1833) to be the only legal tenders. The regulations governing the coinage of the U. States were consolidated by act of Feb. 12, 1873, which fixed the fineness of all gold and silver coin at .900. Under this act the gold coins, legal tender to any amount, are a one-dollar piece, "which, at the standard weight of 25.8, shall be the unit of value;" a quarter-eagle (2½-dollar piece), 64.5 grs.; a three-dollar piece, 77.4 grs.; a half-eagle (5-dollar piece), 129 grs.; an eagle (10-dollar piece), 258 grs.; and a double-eagle (20-dollar piece), 516 grs. The silver coins, "legal tender at their nominal value for any amount not exceeding 5 dollars in any one payment," are a "trade dollar," weighing 420 grs., and intended for the convenience of commerce with China and Japan; a half-dollar (50-cent piece) 12½ grammes, or 192.9 grs.; a quarter-dollar (25-cent piece), and a dime (10-cent piece), in proportional weight with the half-dollar. The minor coins, "legal tender at their nominal value for any amount not exceeding 25 cents in any one payment," are a five-cent and a three-cent piece, three fourths copper and one fourth nickel, weighing respectively 77.16 and 30 grs., and one-cent piece, 95 per cent copper and 5 per cent tin and zinc, weighing 48 grs. The coinage of the standard silver dollar, discontinued by this act of Feb. 12, 1873, was reissued by act of Feb. 28, 1878, and was made a legal tender for all debts, public and private, except when otherwise expressly stipulated in contract. —

The beginning of the secession movement, November, 1860, caused a financial crisis, soon followed by a rapid decline in the revenues of the government. From March 4, 1861, the preparations for war, and its subsequent prosecution, called for immense expenditure, and the treasury notes payable on demand, created by acts of March 2, July 17, and Aug. 5, 1861, and Feb. 12, 1862, being not legal tender, it soon became difficult to enter them into circulation. The treasury was nearly empty, and no further loans could be negotiated by the Secretary of the Treasury, when a bill was passed in Congress, Feb. 25, 1862, for a first issue of $150,000,000 in notes, to be a legal tender for the payment of all debts, public and private. Further issues were authorized by subsequent acts; and by act of June 22, 1874, the volume of all these notes (including fractional currency) was fixed at $382,000,000. The resumption of specie payments was enacted by act of Congress, approved Jan. 14, 1875, to begin Jan. 1, 1879; the plain purpose of this act being to secure to all interests and all classes the benefits of a sound currency, redeemable in coin, with the least possible disturbance of existing rights and contracts. This important measure, whose opportunity was so much discussed, was accomplished with the most wonderful success, and is certainly one of the great events of the century. On Jan. 1, 1879, the day fixed for the resumption of specie payments, the reserve of coin in the treasury, over and above all matured liabilities, was $133,508,804.50. Previous to that time, in view of resumption, U. States notes and coin were freely received and paid in private business as equivalents. Actual resumption commenced without any material demand for coin, and without disturbance to public or private business. No distinction has been made since that time between coin and U. States notes in the collection of duties or in the payment of the principal or interest of the public debt. The total amount of U. States notes presented for redemption from Jan. 1 to Nov. 1, 1879, was $11,256,678. But little coin was demanded on the coin liabilities of the government during the same period, though the amount accruing exceeded $600,000,000. Meantime coin was freely paid into the treasury, and gold bullion was deposited in the assay office, and paid for in U. States notes. The aggregate gold and silver coin and bullion in the treasury increased, during that period, from $167,558,734.19 to $225,133,558.72, and the net balance available for resumption increased from $133,508,804.50 to $152,737,155.48. The specie standard, thus happily secured, gave an impetus to all kinds of business. Many industries, greatly depressed since the panic of 1873, revived, while increased activity was shown in all branches of production, trade, and commerce. For maintaining resumption, the Secretary of the Treasury is authorized, in addition to the use of surplus revenue and the fund for resumption purposes, to issue, sell, and dispose of, at not less than par in coin, either 4, 4½, or 5 per cent bonds of the description set out in the refunding act, approved July 14, 1870. This act is based upon the idea that all the necessary expenditures of the government appropriated for by Congress will be met by the current revenues, leaving the surplus revenues and the reserve-fund available for resumption. It is also provided by that act that the amount of U. States notes to be redeemable on demand in coin shall be gradually reduced to the sum of $300,000,000. The act approved May 31, 1878, increased the maximum of U. States notes, upon which resumption is to be maintained, to the sum of $346,681,016, the amount outstanding at the date of the passage of the act. It also provided as follows: "And when any of said notes may be redeemed or be received into the treasury under any law from any source whatever and shall belong to the United States, they shall not be retired, cancelled, or destroyed, but they shall be reissued and paid out again and kept in circulation." This act must be construed in connection with the provision of the Constitution, that "no money shall be drawn from the treasury but in consequence of appropriations made by law." The reserve-fund created by the resumption act could not, without further legislation, be applied to the payment of current appropriations. Nor is it to be presumed that Congress would omit to provide ample revenues to meet such appropriations. Therefore, under existing law, the notes received into the treasury in exchange for coin will always be available for the purchase of or exchange for coin or bullion. Any U. States notes in the treasury may be exchanged for coin under the authority of section 3700, Revised Statutes. When notes cannot be used at par for that purpose they must necessarily remain in the treasury. To avoid all uncertainty, it is desirable that the resumption-fund be specifically defined by law, and set apart for the redemption of U. States notes, and that the notes redeemed shall only be issued in exchange for or purchase of coin or bullion. The great convenience and easy transportation of notes has thus far enabled the treasury to exchange them for coin or bullion at all the centres of production of gold and silver in this country, and also to pay for large sums of foreign coin at the assay office in New York without any material draft on the resumption-fund; and it is probable that this voluntary exchange will, in ordinary times, furnish the treasury with all the coin necessary. It would be only in an emergency, not easy to foresee, and not likely to arise, that the power to sell bonds for resumption purposes would be exercised, but it should be preserved to meet any extraordinary demand for the redemption of notes which might possibly occur. The provisions of existing law seem to be ample to maintain resumption even upon the present volume of U. States notes. In view, however, of the large inflow of gold into the country and the high price of public securities, it would seem to be a favorable time to invest a portion of the sinking-fund in U. States notes, to be retired and cancelled, and in this way gradually to reduce the maximum of such notes to the sum of $300,000,000, the amount fixed by the resumption act. The drawback of the resumption act lies in the fact that it does not provide for a real redemption of our paper currency. The whole volume of it remains in circulation, and a regrettable law requires the Secretary of the Treasury to pay out the legal-tender notes as fast as they are received in exchange for coin. Any contraction of the government paper is thus rendered illegal, even when imported gold is flooding all the channels of circulation. Such resumption does not reduce the volume of paper even when gold is so abundant that the legal-tender notes could be withdrawn without any contraction of the circulating medium. With gold enough to take their place and dispense with their use, it is still the policy of the government to pay them out as fast as they are received, and so nullify the redemption. The power of Congress to make notes a legal tender in the payment of debts was asserted by Congress during the war, and was upheld by the Supreme Court. The power to reissue them

in time of peace, after they are thus redeemed, is still contested in that court. Prior to 1862 only gold and silver were a legal tender. Bullion was deposited by private individuals in the mints and coined in convenient forms and designs, indicating weight and fineness. Paper money is a promise to pay such coin. No constitutional objection is raised against the issue of notes not bearing interest to be used as a part of the circulating medium. The chief objection to the emission of paper money by the Government grows only out of the legal-tender clause, for without this the U. States note would be measured by its convenience in use, its safety, and its prompt redemption. In war, and during a grave public exigency, other considerations may properly prevail; but it would seem that during peace, and, especially, during times of prosperity and surplus revenue, the promissory note of the U. States ought to stand like any other promissory note. It should be current money only by being promptly redeemed in coin on demand. The note of the U. States is now received for all public dues, it is carefully limited in amount, it is promptly redeemed on demand, and ample reserves in coin are provided to give confidence in and security for such redemption. With these conditions maintained the U. States note would be readily received and paid on all demands. While they are maintained, the legal-tender clause gives no additional credit or sanction to the notes, but while nullifying resumption, it tends to impair confidence and to create fears of over-issue. It is, therefore, a useless and

Fig. 358. — Money of Japan.
Twenty Yen (gold).

objectionable assertion of power, which Congress ought to repeal on the ground of expediency alone. When it is considered that its constitutionality is seriously contested, and that from its nature it is subject to grave abuse, it would now appear to be wise to withdraw the exercise of such a power, leaving it in reserve to be again resorted to in such a period of war or grave emergency as existed in 1862. The Government derives an advantage in circulating its notes without interest, and the people prefer such notes to coin, as money, for their convenience in use and their certain redemption in coin on demand. This mutual advantage may be secured without the exercise of questionable power; nor need any inconvenience arise from the repeal of the legal-tender clause as to future contracts. Contracting parties might stipulate for either gold or silver coin or current money. In the absence of an express stipulation for coin the reasonable presumption would exist that the parties contemplated payment in current money, and such presumption might properly be declared by law and the contract enforced accordingly. — Another very serious defect in the resumption experiment was created by the act of Feb. 28, 1878, already mentioned, under which we are coining, in unlimited amount, base silver dollars in which the paper currency of the country can be redeemed. When the resumption act passed, gold was the only coin which by law was a legal tender in payment of all debts. That act contemplated resumption in gold coin only. No silver coin of full legal tender could then be lawfully issued. The only silver coin provided was fractional coin, which was a legal tender for five dollars only. The law of 1878 itself clearly shows that the silver dollar was not to supersede the gold dollar; nor did Congress propose to adopt the single standard of silver, but only to create a bimetallic standard of silver and gold, of equal value and equal purchasing power. Congress, therefore, limited the amount of silver dollars to be coined to not less than two millions nor more than four millions per month, but did not limit the aggregate amount nor the period of time during which this coinage should continue. The market value of the silver in the dollar, at the date of the passage of the act, was 93¼ cents in gold coin, but it soon fell to about 86 cents in gold coin. If it was intended by Congress to adopt the silver instead of the gold standard, the amount provided for it was totally inadequate for the purpose. Experience, not only in this country but in European countries, has established that a certain amount of silver coin may be maintained in circulation at par with gold, though of less intrinsic bullion value. It was, probably, the intention of Congress to provide a coin in silver which would answer a multitude of the purposes of business life, without banishing from circulation the established gold coin of the country. To accomplish this it was indispensable either that the silver coin be limited in amount, or that its bullion value be equal to that of the gold dollar. As it is, its use is forcibly limited to domestic purposes. It cannot be exported except at its commercial value as bullion. If issued in excess of demands for domestic purposes, it will necessarily fall in market value, and, by a well-known principle of finance, will become the sole coin standard of value. Gold will be either hoarded or exported. When two currencies, both legal, are authorized without limit, the cheaper alone will circulate. If, however, the issue of the silver dollar was limited to an amount demanded for circulation, there would be no depreciation, and its convenient use would keep it at par with gold, as fractional silver coin, issued under the act of Feb. 21, 1853, was kept at par with gold. Gold and silver have varied in value from time to time in the history of nations, and laws have been passed to meet this changing value. In our country, by the act of April 2, 1792, the ratio between them was fixed at one of gold to fifteen of silver. By the act of June 28, 1834, the ratio was changed to one of gold to sixteen of silver. For more than a century the market value of the two metals had varied between these two ratios, mainly resting at that fixed by the Latin nations, of one to fifteen and a half. But we cannot overlook the fact that within a few years a great change has occurred in the relative value of the two metals. It would seem to be expedient to recognize this controlling fact — one that no nation alone can change — by a careful readjustment of the legal ratio for coinage of one to sixteen, so as to conform to the relative market values of the two metals. The ratios

heretofore fixed were always made with that view, and, when made, did conform as near as might be. Now that the production and use of the two metals have greatly changed in relative value, a corresponding change must be made in the coinage ratio. There is no peculiar force or sanction in the present ratio that should make us hesitate to adopt another, when in the markets of the world it is proven that such ratio is not now the true one. The addition of one tenth or one eighth to the thickness of the silver dollar would scarcely be perceived as an inconvenience by the holder, but would inspire confidence, and add greatly to its circulation. As prices are now based on U. States notes at par with gold, no disturbance of values would result from the change. It appears from the recent conference at Paris, invited by the U. States, that other nations will not join with us in fixing an international ratio, and that each country must adapt its laws to its own policy. The tendency of late among commercial nations is to the adoption of a single standard of gold and the issue of silver for fractional coin. We may, by ignoring this tendency, give temporarily increased value to the stores of silver held in Germany and France until our market absorbs them, but by adopting a silver standard as nearly equal to gold as practicable, we would make a market for our large production of silver, and furnish a full, honest dollar that would be hoarded, transported, or circulated, without disparagement or reproach. The total amount of silver dollars coined to Nov. 1, 1879, under the act of 1878, was $45,206,200, of which $13,002,842 was in circulation, and the remainder, $32,203,358, in the treasury at that time, though no effort had been spared to put this coin in circulation. Owing to its limited coinage it was kept at par; but its free coinage would soon, as already said, reduce its current value to its bullion value, and thus establish a single silver standard, the inevitable result being to exclude gold coin from circulation. It is impossible to ascertain what amount of silver coin, based upon the ratio of sixteen of silver to one of gold, could be maintained at par with gold, but it is manifest that this can only be done by the Government holding in its vaults the great body of the silver coin. The Secretary of the Treasury, well aware of the formidable danger resulting from an unlimited coinage of the base silver dollar, repeatedly urged (annual reports for 1878 and 1879), but without apparent effect, the importance of adjusting the coinage ratio of the two metals by treaties with commercial nations; and, until this can be done, of limiting the coinage of the silver dollar to such a sum as, in the opinion of Congress, would enable the treasury to readily maintain the standard dollars of gold and silver at par with each other. — The coin in the U. States, at the beginning of 1880, was estimated by the director of the mint at $305,750,497 of gold, and $121,456,355 of silver. The bullion in the mints and New York assay office at that date awaiting coinage amounted to $49,931,035 of gold and $4,553,182 of silver, making the total amount of coin and bullion $481,691,069. The estimating of the specie in the country at any given time is always difficult; but this estimate appears to have been carefully prepared from coinage reports and statistics of recoinage, export, and import. The amount of gold and silver annually used in the arts and manufactures forms no inconsiderable factor in estimating the production of the mines or the specie available for circulation, and an attempt has been made to arrive at the amounts so used from the records of the New York assay office, which furnishes the principal part of the metals consumed for these purposes, and from reports of the manufacturers. The general result, while incomplete in details, indicates that the total consumption for purposes other than coinage is in excess of estimates heretofore made. See MINT, NATIONAL DEBT, NATIONAL BANKS, etc. The following table of coins of the principal nations of the world is copied from a recent report of the director of the U. States mint. —

GOLD.

(Values computed at $18 60 4 per oz. standard value of the U. States coins.)

Countries and Denominations	Weight in ounces.	Fineness 1000ths.	Value.
AUSTRIA.			
Ducat	0 112	986	$2 28.3
Souverain	0.363	900	6 75 4
Four florins	0 104	900	1 93 5
BELGIUM			
Twenty-five francs	0.254	899	4 72
BOLIVIA.			
Doubloon	0.867	870	15 59.3
BRAZIL.			
Twenty millreis	0.575	917 5	10 90 6
CENTRAL AMERICA			
Two escudos	0.209	853.5	3 68 8
Four reals	0 027	875	0 48.8
CHILI.			
Old doubloon	0 867	870	15 59 3
Ten pesos	0.492	900	9 15 4
COLOMBIA.			
Old doubloon, Bogotá	0.868	870	15 61.1
" " Popayan	0.867	858	15 37 8
Ten pesos	0.525	891.5	9 67 5
DENMARK.			
Ten thalers	0.427	895	7 90
ECUADOR			
Four escudos	0.433	844	7 55.5
ENGLAND.			
Pound or sovereign, new	0.256.7	916.5	4 86.3
" " average	0.256 2	916	4 85.1
Guinea (1798)	0.269.6	916.6	5 12
FRANCE			
Twenty francs, new	0 207.5	899	3 85.8
" " average	0 207	899	3 84.7
GERMANY.			
Ten thalers, Prussian	0.427	903	7 97.1
Twenty marks	0.256	900	4 76.2
GREECE.			
Twenty drachmas	0 185	900	3 44.2
INDIA (BRITISH).			
Mohur	0 374	916	7 08.2
ITALY.			
Twenty lire	0 207	898	3 84.3
JAPAN.			
Old cobang	0 362	568	4 44
" "	0.289	572	3 57.6
Twenty yens	1.072	900	19 94.4
MEXICO.			
Doubloon, average	0 867 5	866	15 53
" new	0.867 5	870 5	15 61.1
Twenty pesos (Maximilian)	1.086	875	19 64.3
" " (Republic)	1 081	873	19 51.5
NAPLES			
Six ducats, new	0.245	996	5 04.4
NETHERLANDS.			
Ten guilders	0 215	899	3 99.7
PERU.			
Old doubloon	0 867	868	15 55 7
Twenty soles	1 055	898	19 21.3
PORTUGAL.			
Gold crown	0 308	912	5 80.7
RUSSIA			
Five rubles	0.210	916	3 97.6
SPAIN			
One hundred reals	0 268	896	4 96 4
Eighty reals	0 215	869 5	3 86.4
Ten escudos	0 270 8	896	5 01.5
SWEDEN.			
Ducat	0 111	875	2 23 7
Carolin, ten francs	0 104	900	1 93.5
TUNIS.			
Twenty-five piastres	0 161	900	2 99.5
TURKEY.			
One hundred piastres	0 231	915	4 36.9

GOLD. — *Continued.*

Countries and Denominations.	Weight in ounces.	Fineness 1000ths.	Value.
TUSCANY.			
Sequin	0.112	999	$2 31.3
UNITED STATES			
Double eagle	1.075	900	20 00
Eagle (before 1834)	0.562.5	916$\frac{2}{3}$	10 65.8
" (since 1834)	0.537.5	900	10 00
Half-eagle	0.268$\frac{3}{4}$	900	5 00
Three dollars	0.161$\frac{1}{4}$	900	3 00
Quarter eagle	0.134$\frac{3}{8}$	900	2 50
Dollar	0.053$\frac{3}{4}$	900	1 00

SILVER.

(Values computed at $1 22$\frac{1}{2}$ per oz. standard.)

Countries and Denominations.	Weight in ounces.	Fineness 1000ths.	Value.
AUSTRIA.			
Old reichsthaler	0.902	833	$1 02.3
Old scudo	0.836	902	1 02.6
Florin (before 1858)	0.451	833	51.1
New florin	0.397	900	48.6
New union reichsthaler	0.596	900	73.1
Maria Theresa reichsthaler (1780)	0.895	838	1 02.1
BELGIUM.			
Five francs	0.803	897	98
Two francs	0.320	835	36.4
BOLIVIA.			
New dollar	0.801	900	98.1
BRAZIL			
Double milreis	0.820	918.5	1 02.5
CANADA.			
Twenty cents	0.150	925	18.9
Twenty-five cents	0.187.5	925	23.6
Fifty cents	0.375	925	47.2
CENTRAL AMERICA.			
Dollar	0.866	850	1 00.2
CHILI.			
Old dollar	0.864	908	1 06.8
New dollar	0.801	900.5	98.2
CHINA.			
Dollar (English)	0.866	901	1 06.2
Ten cents	0.087	901	10.6
COLOMBIA.			
Dollar of 1857	0.803	896	98
DENMARK			
Two rigsdalers	0.927	877	1 10.7
ENGLAND.			
Shilling, new	0.182.5	924 5	23
" average	0 178	925	22.4
Florin (1852)	0.363.6	925	45
Half-crown (1845)	0.454.5	925	56
FRANCE.			
Five francs, average	0.800	900	98
Two "	0.320	835	36.4
Franc (1860)	0.160	900	18.2
GERMANY, NORTH.			
Thaler (before 1857)	0 712	750	72.7
New thaler	0.595	900	72.9
GERMANY, SOUTH			
Florin (before 1857)	0 340	900	41.7
New florin	0.340	900	41.7
GREECE			
Five drachmas	0.719	900	88.1
INDIA (BRITISH)			
Rupee	0 374	916.5	46 6
ITALY			
Five lire	0 800	900	98
Lira	0.160	835	18.2
JAPAN.			
Itzebu	0.279	991	37.6
New itzebu	0.279	890	33.8
Yen	0 866.7	900	1 00.8
Fifty sens	0.402	800	44.6
MEXICO			
Dollar, new	0 867.5	903	1 06 6
Dollar, average	0 866	901	1 06 2
Peso of Maximilian	0.861	902.5	1 05.5
NAPLES			
Scudo	0 844	830	95.3
NETHERLANDS			
Two and a half guilders.	0.804	944	1 03 3
NORWAY.			
Specie daler	0.927	877	1 10 7

SILVER. — *Continued.*

Countries and Denominations.	Weight in ounces.	Fineness 1000ths.	Value.
PERU.			
Old dollar	0.866	901	$1 06.2
Dollar of 1858	0.766	909	94.8
Half-dollar (1835 and 1838)	0.433	650	38.3
Sol	0.802	900	98.2
PORTUGAL.			
Five hundred reis	0.400	912	49.6
ROME.			
Scudo	0.864	900	1 05.8
RUSSIA.			
Ruble	0.667	875	79.4
SPAIN.			
Five pesetas (dollar)	0.800	900	98
Peseta (pistareen)	0.160	835	18.2
SWEDEN.			
Specie daler	1.092	750	1 11.5
SWITZERLAND.			
Two francs	0.320	835	36.4
TUNIS.			
Five piastres	0.511	898.5	62 5
TURKEY.			
Twenty piastres	0.770	830	87
UNITED STATES.			
Dollar	0.859.4	900	1 04.5*
Half-dollar (since 1853)	0.400	900	50
Quarter-dollar	0.200	900	25
Dime	0.080	900	10
Half-dime	0.040	900	5
Three cents	0.024	900	3
(Act of 1873.)			
Dollar	0.875	900	....
Hal-fdollar	0.401.8	900	....
Quarter-dollar	0.200.9	900	....
Dime	0.080.3	900	....

Money of Account, certain denominations or divisions of money in which accounts are kept, which may or may not be coins, but fixed proportions to coins. All accounts and other computations of money in the U. States are kept and made out in the money of account of the U. States, that is to say, in dollars or units, dimes or tenths, cents or hundredths, mills or thousandths, a dime being the $\frac{1}{10}$ part of a dollar, a cent the $\frac{1}{100}$ part of a dollar, and a mill the $\frac{1}{1000}$ part of a dollar. — *T. McElrath.*

Money-Broker, Money-Changer, Money-Dealer, names for exchange-brokers and bullion-dealers.

Moneyers, workmen employed in the mint to forge, shear, round, mill, and stamp coin.

Money-Market, a general term for the transactions in Wall Street, the Stock Exchange, etc., where discounts, loans, and payments are transacted. The money-market is said to be *tight* or *easy*, according to the scarcity or abundance of money in the banks, the high or low rate of interest, the difficulty or facility with which money can be obtained on securities, etc.

Money-Order, a convenient form of safely transmitting small sums of money, carried on to a great extent by the U. States Post-office Department through its branches. The principal means employed to attain safety consist in leaving out of the order the name of the payee or person for whom the money is intended. In this respect a money-order differs from an ordinary bank draft or check. An advice or notification, containing full particulars of the order, is transmitted without delay by the issuing postmaster to the postmaster at the office of payment. The latter is thus furnished, before the order itself is presented, with information which will enable him to prevent its payment to any person not entitled thereto, *provided the remitter complies* with the regulation of the Department which

* As compared with the half-dollar.

prohibits him from sending the same information in a letter enclosed with his order.

Post-office Regulations. — Under no circumstances can payment of an order be demanded on the day of its issue. The fees or charges for money-orders will be as follows: —

On orders not exceeding $15	10 cents.
On orders over $15 and not exceeding $30	15 cents.
" " " $30 " " " $40	20 cents.
" " " $40 " " " $50	25 cents.

When a larger sum than fifty dollars is required, additional orders to make it up must be obtained. But postmasters are instructed to refuse to issue in one day, to the same remitter and in favor of the same payee, more than *three* money-orders payable at the same post-office. The plain evasion of this rule by the substitution of a different remitter for every three orders issued in one day in favor of the same payee must not be tolerated by postmasters. — The money-orders must be made out upon printed forms supplied by the Post-office Department, and no order will be valid or payable unless given upon one of such forms. — Any person applying for a money-order will be required to state the particulars upon a form of application, which will be furnished to him for that purpose by the postmaster. — If the purchaser of a money-order, from having made an error in stating the name of the office of payment, or for other reasons, desires to have the said money-order changed, the issuing postmaster will repay the first order, and issue another in lieu thereof, for which an additional fee must be charged and exacted as for a new transaction. — When a money-order is presented for payment at the office upon which it is drawn, the postmaster or authorized clerk will use *all proper means* to assure himself that the applicant *is the person named and intended in the advice*, or is the indorsee of the latter; and upon payment of the order care must be taken to obtain the signature of the payee (or of the person authorized by him to receive payment) to the receipt on the face of the order. — When for any reason the payee of a money-order does not desire or is unable to present the same in person, he is legally empowered, by his written indorsement thereon, to direct payment to be made to any other person; and it is the duty of the postmaster upon whom the order is drawn to pay the amount thereof to the person thus designated, provided the postmaster is satisfied that such indorsement is genuine, and that the second party shall, if required, *prove his identity*, and shall give correct information as to the name and address of the person who originally obtained the order. *More than one indorsement is prohibited by law, and will render an order invalid and not payable.* The signature to the receipt on the face of the order *should be that of the person who presents and receives payment of the same.* — Any money-order office may repay an order issued by itself, *provided the order is less than one year old, and does not bear more than one indorsement;* but the repayment must be made to the person who obtained the order, except in special cases. The fee or charge will not in any case be refunded. — A money-order may be issued for any amount from *one cent* up to *fifty dollars*, inclusive; but fractional parts of a cent must not be introduced into any money-order or account. — When an order is presented for which no advice has been received, one of the printed letters of inquiry for missing advices must at once be despatched to the postmaster who issued the order. Under no circumstance whatever can an order be paid until the corresponding advice shall have been received. — Postmasters are prohibited from paying a money-order to a second person without the written indorsement to such second person by the payee on the back of the order, unless the payee has, by a duly executed power of attorney, designated and appointed some person to collect moneys due or to become due him, in which case the attorney should be required, before payment is made him, to file at the office of payment a certified copy of such power of attorney — After once paying a money-order, by whomsoever presented, provided the required information has been given by the party who presented it, the Department will not hold itself liable to any further claim, but in case of improper payment of an order, will endeavor to recover the amount for the owner. — In case a money-order is lost in transmission, or otherwise, a duplicate will be issued by the superintendent of the money-order system, on the receipt of the application therefor of either the remitter, the payee, or the indorsee of the original. The duplicate can be made payable only to the payee, or, in case of indorsement, to the indorsee of the original, unless the written consent of the payee or indorsee to the repayment of the order, by duplicate, to the remitter, shall have been obtained by the latter, and duly filed in the Department. If the owner of the order (whether the payee or indorsee), or his legal representative, *cannot, after the lapse of a reasonable time, be found*, the remitter should forward to the Department satisfactory evidence of that fact, if he desires repayment. A blank bond of indemnity, in a penal sum of double the amount of the lost money-order, will then be sent him, to be executed by himself and two sureties, and returned to the Department; the condition of such bond being that if, after the issue and payment of a duplicate order to the remitter, any other person establishes a valid adverse claim to the original order, the amount so paid by duplicate shall be refunded to the Post-office Department. Upon full compliance with the above requirements, the remitter thus situated will receive a duplicate of the lost order — A duplicate order can be drawn only on the issuing or the paying office of the original order, and becomes invalid if it bear more than one indorsement. — No fee is to be charged by a postmaster for the delivery of a duplicate issued in place of a lost or invalid order The postmaster who receives from the Department a duplicate payable by him must forthwith send notice to the payee of such duplicate to call for payment — Any order which is not presented for payment until after the expiration of one year from the date thereof, is declared "invalid and not payable" by the fourth section of the act approved June 12, 1866, and the postmaster to whom such order is presented must refuse payment of the same. In order to obtain payment of such invalid order, the holder will be required to forward the same, through the issuing or the paying postmaster, to the money-order office of the Post-office Department. If the Department is satisfied that the order has not been paid, a duplicate will be issued made payable to the remitter, payee, or indorsee, as may be requested in the application, and the same will be sent to the postmaster for delivery or payment, as the case may be.

Money Scrivener, one who obtains money on loan for others.

Monger, a small vessel used by fishermen.

Mongrel, an animal of a mixed breed.

Monitor, the popular name for a class of American iron-clad war-vessels, invented by Capt. John Ericsson of New York, in which the guns are carried in one or more iron turrets, which may be rotated either by hand-winches or by a steam-engine, so that the guns may be fired in any required direction, and which derives its name from that of the first vessel of this kind that was constructed, and launched early in 1862.

Monkey, the weight of a pile or post driver, that is, a very heavy mass of iron, which, being raised on high, descends with great momentum on the head of the pile or post, and forces it into the earth.

Monkey-Block, a small, strapped, single block.

Monkey-Boat, a small boat employed in harbor-service.

Monkey-Bread, a name for the large fruit of the *Adansonia digitata*, the slightly acid pulp of which is used as an article of food by the natives of Africa.

Monkey-Hammer is a form of power-hammer, in which the driver, consisting of a monkey which slides in guides, is alternately raised and dropped.

Monkey-Wrench, a spanner with a movable jaw, which can be adjusted by a screw or wedge to the size of the nut which it is required to turn.

Monk's-Hood. See Aconite.

Monk's-Seam, a seam made by laying the selvages of sails one over the other.

Monocle [Fr.], a reading-glass for one eye.

Monongahela Whiskey, a celebrated rye whiskey, chiefly distilled in the valley of the Monongahela River, in Western Pennsylvania.

Monopoly, a privilege granted by license, conferring on an individual or company the sole right of purchasing and disposing of, making or using, a certain specified article; the term is likewise sometimes used to denote the engrossing of commodities with the view of selling them at a high price.

Monrovia. See Liberia.

Monsoons, periodical trade-winds, which blow six months in one direction, and the rest of the year in an opposite one. They prevail in the Indian Ocean N. of the 10th degree of S. latitude. From April to October a violent S. W. wind blows, accompanied with rain, and from October to April a gentle, dry N. E. breeze prevails. The change of the winds or the *breaking up* of the *M.*, as it is called, is accompanied by storms and hurricanes.

These periodical currents of winds do not reach very high, as their progress is arrested by mountains of a moderate height. *M.* are, for the most part, formed of trade-winds. When, at stated seasons of the year, a trade-wind is deflected in its regular course from one quadrant to another, or drawn in by over-heated districts, it is regarded as a *M.* Thus the African *M.* of the Atlantic, the *M.* of the Gulf of Mexico, and the Central American *M.* of the Pacific are, for the most part, formed of the trade-winds which are turned back or deflected to restore the equilibrium which the over-heated plains of Africa, Utah, Texas, and New Mexico have disturbed. When the *M.* prevail for five months at a time, for it takes about a month for them to change and become settled, then both they and the trade-winds which they replace are called *M.* The N. E. and the S. W. *M.* of the Indian Ocean afford an example of this kind. A force is exerted upon the N. E. trade-winds of that sea by the disturbance which the heat of summer creates in the atmosphere over the interior plains of Asia, which is more than sufficient to neutralize the forces which cause those winds to blow as trade-winds; it arrests them; and were it not for the peculiar conditions of the land about that ocean, what are now called the N. E. *M.* would blow the year round; there would be no S. W. *M.* there; and the N. E. winds, being perpetual, would become all the year, what in reality for several months they are, viz. N. E. trade-winds. The N. E. and S. E. trade-winds meet, we know, near the equator, where they produce the belt of equatorial calms. All vessels that pass from one system of trade-winds to the other have to cross this calm belt. Sometimes they clear it in a few hours. Sometimes they are delayed in it for weeks; and the calm is so still and the rain so copious that the fresh water is sometimes found standing in pools on the sea.

Montana, a Territory of the U. States, lying between lat. 44° 15′ and 49° N., lon. 104° and 116° W.; and bounded N. by British America, E. by Dakota, S. by Wyoming, and W. by Idaho; its greatest length E. and W. is 540 m., average breadth, 275 m.; area, 145,776 sq. m. It is divided into 11 counties. *Helena*, the capital, and the largest town in the Territory, is situated on the W. side of the valley of Prickly Pear and Ten Mile creeks, at the foot of the Rocky Mountains, 15 m. W. of the Missouri River, and 110 m. N. of Virginia City. It is the largest town in the Territory, and derives its importance from the rich quartz and placer gold mines in the vicinity. Pop. 5,000. The other principal cities or towns are Argenta, Bannack, Bozeman, Deer Lodge City, Diamond City, Fort Benton, Gallatin, Missoula City, Radersburg, and Virginia City (the former capital). Population of the Territory, about 40,000.

M. consists of a series of basins, five in number; four of them lying on the E. side of the Rocky Mountains, and one on the W. These basins are for the most part subdivided into a number of valleys by spurs jutting down from the main chain of the "Rockies." These offshoots are often of great elevation, frequently exceeding that of the parent chain; but there are numerous passes between them, connecting the valleys with each other by low gaps, which are open at all seasons of the year. The basin W. of the Rocky Mountains, in the N. W. corner of the Territory, is drained by the Flathead and Missoula Rivers and their branches, the last-mentioned being the outlet of the lake of the same name. This lake is surrounded by a beautiful country, a portion of which is valuable for agricultural purposes. From this sheet of water there extends S. along the base of the mountains to Pend d'Oreilles Mission, a distance of over 50 m., a well-wooded, gently rolling country, clothed with a good growth of grass, a large proportion being excellent farming land, then crossing a range of hills to the S., the Jocko Valley is entered, which, though small, in beauty and fertility is unsurpassed. Here is located the reserve of the Pend d'Oreilles Indians. From this point crossing, by an easy pass, the lofty mountain-spur running down from the main chain between the Jocko and Hell-gate Rivers, the valley of the latter is reached, which is 25 m. long, with an average breadth of 6 m. This tract is nearly all excellent farming land, with a good coating of bunch-grass, and a large proportion of it covered with valuable pine timber. The Bitter Root Valley, also fertile, extends S. 60 m., with an average breadth of 7 or 8 This valley, with that of Hell-gate, contains many settlers, whose number is rapidly increasing. These valleys are bounded on the W. by the Bitter Root Mountains, covering an extent of country 75 m. wide, reaching to the valley of Snake River in Idaho, and 200 m. in length. This region is very lofty, snow lying on many of the peaks the entire year. Big Blackfoot River runs through a cañon for 15 m. above its mouth, where it opens into a large and picturesque valley, well timbered and watered, and betokening a good grazing region. Ascending Hell-gate cañon 40 m., we emerge into the rolling grassy hills, which reach 12 m. to the valley of Flint Creek, a locality well adapted to grass and the cereals. Deer Lodge Valley is also available for agricultural purposes; for, though possessing within itself but a sparse growth of wood, yet the surrounding mountains are well timbered. This valley is 35 m. long, averages 10 m. in width, and is drained by the Deer Lodge River and its affluents; but at the lower end its name becomes changed to that of Hellgate River, its course being from N. to N. W. The N. W. basin contains 8 principal valleys, viz.: those of the Flathead Lake, Mission, Jocko, Hell-gate, Bitter Root, Big Blackfoot, Flint Creek, and Deer Lodge, besides many other smaller ones of great beauty and fertility. The watershed of this basin trends towards the N. W., and is 250 m. long, having an average width of 75 m. It forms the best-timbered section of the Territory, owing, probably, to the moist warm winds blowing from the Pacific Ocean, and generating a luxuriant vegetation. The N. E. basin extends from the Rocky Mountains to the E. frontier of the Territory, along its N. extremity, a distance of nearly 600 m. by 150. The E. portion of this vast region is composed of clay table-lands or "mauvaises terres"; but there is, nevertheless, a large area of cultivable land along the river-courses. The basin is drained in the direction of the E. by the Milk, Marias, Teton, Sun, and Dearborn Rivers, the first three emptying into the Missouri below Fort Benton, and the last two a short distance above the Great Falls. The W. portion of this basin is but little broken by mountains. The W. central basin is drained to the E. by the Jefferson Fork of the Missouri, and its tributaries, of which the principal are the Big Hole and Beaver-head Rivers. This basin lies in the shape of a spread fan, being 150 m. wide by 100 long. The E. central basin is drained by the Missouri River below the Three Forks, and above them by the Jefferson Fork, into which empty the N. Boulder Creek, S. Boulder Creek, and Williams's Creek. This basin contains a large area of arable land, with a climate fully equal to that of Utah. Its dimensions are 150 m. in length from N. to S., by 80 m. E. and W., and it contains 6 principal valleys, viz.: those of the Jefferson, of the Three Forks, of the N Boulder, of the lower part of the Jefferson, of the Madison, and of the Gallatin. It comprises even a greater extent of farming lands than the basin of the Beaver-head and affluents. Next, and last, is the basin of the Yellowstone and its branches. This flows towards the E. and is 400 m. long by 150 wide. In climate and productive capacity this valley forms a medium between the valleys of the mountains and prairies of the Western States; corn, beans, and pumpkins thrive here, and attain considerable size. This basin contains 7 principal valleys, viz : the main valley of the Yellowstone, of Shields's River, of the Rosebud, of Clark's and Pryor's Forks, and of the Bighorn River, besides numerous smaller ones. The Yellowstone River is navigable for steamers of light draught nearly to the W. edge of the basin, or almost to the centre of the Territory —The climate of *M.* in the mountainous districts is as cold as that of the New England States. Snow generally falls to a great depth, so that communication in the higher regions is somewhat irregular and uncertain during the winter. In the valleys, where the altitude is less, the temperature is milder In Deer Lodge and Gallatin and Madison valleys, farm-stock continues in good condition throughout the year, without fodder or grain, the grass being in sufficient abundance nearly all the time. *M.* is a remarkably healthy country, there seeming to be no peculiar diseases ascribable to climatic influence. — Veins of gold, copper, lead, and iron are found largely distributed through all the mountainous portions of the Territory. So far as discovered, they usually come to the surface on the foot-hills, and sides of the valleys and cañons. A large portion of these lodes are *true veins*, cutting through granite, syenite, porphyry, trap, gneiss, mica slate, hornblende slate, talcose slate, argillaceous slates, sandstone, and limestone. These veins vary in thickness from a few inches to 50 or 60 ft. The gangue, or vein rock, or, as called by the miners, *quartz*, is very variable in character. In the gold-bearing veins it is usually a whitish quartz, more or less ferruginous,— often, indeed, nearly all iron. In some

veins it resembles a stratified quartzite; in others it is syenitic; pyrites, hornblende, calc-spar, arsenic, antimony, copper, and tellurium are found in these veins. In the silver veins the iron so rife in the gold veins is usually replaced by oxide of manganese. This mineral is sometimes so abundant as to constitute the larger portion of the gangue. The latter, in many of the copper-mines, is usually quartz, heavy spar, calc-spar, and brown spar more or less commingled. There seems to be no marked segregation from one another of the gold, silver, copper, or coal bearing localities, other than that the coal deposits are found mainly in the sedimentary foundations of the E. Gold is found over a wide extent of country, the main development of which, up to the present time, has been expended on placer deposits. Gold quartz mines have been extensively worked in the vicinity of Bannack, Virginia City, Helena City, Highland, etc. Silver is chiefly found in the Blue Wing and Argenta districts in the S. W., also in the neighborhood of Jefferson City, in several of the localities near Helena, etc. Gold was first discovered in *M.* in 1852, but no mining took place until the last part of 1861, since which time, down to the end of 1879, the bullion produced by *M.* amounted to about $140,000,000. The maximum produced in a year was $16,500,000 in 1866; the minimum was $2,260,511 gold, and $1,669,635 in 1868. In 1868 and 1869, however, more rapid and substantial progress was made in the development of mines and treatment of the silver ores than ever before in *M.* In many localities the character of the ores was for a long time imperfectly understood. The surface products gave little indication of what elements might be found in combination where the vein-matter was found solidified as depth was attained, and many of the metallurgical methods adapted to the treatment of the friable surface-ores were found altogether inadequate to reduce the refractory products reached in many places only a few feet below. In some localities, notably Butte, the ores are sufficiently free to be milled without previous roasting at present; but even there they are more rebellious below water, and the mills are being supplemented by furnaces that will complete the process necessary to extract the precious metals. Development has progressed sufficiently to determine the probable permanency of the lodes, although deep mining is yet unknown, 500 feet being the exceptionally deep working in the Territory. The most prominent and productive silver-mining camp in the Territory at present is Butte, about 50 m. S. of Helena. The mines in the vicinity of Jefferson City have developed recently far beyond expectation, a single one producing at least 2,000 tons of excellent ore, while the reduction works established there by the Montana Company are already beginning to show profitable results.—In former times the enormously rich placers of this region were its chief attraction, and are still a source of large income. In localities where mines of this character have been exhausted, or nearly so, the development of the various quartz-lodes is beginning to supply the deficit. Requisite machinery for the proper reduction of the ores is rapidly supplying the camps wherever sufficient work has been done to render permanency probable. The ranking mines in the Silver Creek District, recently made famous by the "Penobscot Bonanza," are the Penobscot and Snowdrift, Belmont, Whippoorwill, Mount Pleasant, Bluebird, Leopard, etc. Forty stamps and two arastras, besides apparatus for concentrating the mineral out of the tailings, are now in operation on rock, some of which, from the first-named mine, still averages nearly one hundred dollars per ton. Silver Star District, about 75 m S. of Helena, is also producing well with moderate facilities. The renewed activity in mining has reached the Cable district, and work which, owing to legal complications, has been suspended for a long time, is now revived. Other smaller camps are organizing in many directions and, with advent of suitable facilities for the extraction of the metals from the ore, promise to yield generous returns for the outlay.—The principal cultivated crops are wheat, rye, oats, and potatoes (see these names). Beans, pease, turnips, beets, carrots, onions, cabbages, squashes, melons, tomatoes, cucumbers, and the hardier fruits thrive. Among wild animals are the buffalo, in the eastern plains, the grizzly bear, and the antelope. There are no railroads in *M.*, but the Northern Pacific is to cross the territory from E. to W. In 1879 *M* had 3 national banks, whose paid-in capital was $350,000; there were besides 8 savings-banks and private bankers, with an aggregate capital of $133,413.

Montauk Fire-Insurance Co., located in Brooklyn, N. Y., organized in 1857. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $109,954.71; premiums, $81,767.66. Premiums received since the organization of the Co., $1,573,976.76; losses paid, $662,-543.87; cash dividends paid to stockholders, $453,500.

Mont de Piété, a public pawnbroking office, kept by the government, in France, Belgium, Italy, etc.

Montenegro, a small Principality of eastern Europe, which has recently won its independence from Turkey, having N. Herzegovina, E. Bosnia, S. Albania, and W. a narrow strip of Austrian Dalmatia, separating it from the Adriatic; lat. between 42° 10′ and 43° 10′ N., lon. 18° 41′ and 19° 30′ E.; area, 1,710 sq. m. The surface is generally mountainous and rugged, rising in some places to peaks 5,000 ft. above the sea, and are well timbered. The rivers are numerous, flowing S. E. into the Moracca, which falls into Lake Scutari, the neighborhood of which is very fertile, the other parts of *M.* being generally unfertile. Agriculture is the principal occupation, the chief products being Indian corn, potatoes, and tobacco. The only manufactures are coarse woollens.

Montero, a Spanish horseman's cap.

Montevideo. See URUGUAY.

Monthly, a magazine or periodical published every month.

Monton [Sp.], a miner's name for a heap of ore; a batch under the process of amalgamation, varying in quantity in different localities from 15 to 32 quintals.

Mont-Rachet. See BURGUNDY WINES.

Montreal, a city and river port of entry of the Dominion of Canada, in the province of Quebec, and the largest and most populous city and chief seat of commerce of British North America. It is situated in lat. 45° 30′ N., lon. 73° 25′ W., on the S. E. side of an island of the same name at the confluence of the rivers Ottawa and St. Lawrence, which last river is here spanned by the tubular Victoria bridge of the Grand Trunk Railway, 142 m. in a direct line S. W. of Quebec, 310 m. N. E. of Toronto, 335 m. N. of New York, and 600 m. from the mouth of the St. Lawrence. The site is not so commanding as that of Quebec, but it is in every other respect superior to that city. The position of *M.*, at the head of the ship navigation of the St. Lawrence, and at the foot of that great chain of inland waters which extends from the Lachine canals to the W. shore of Lake Superior, as well as its situation with respect to the city of New York, necessarily makes it one of the greatest emporiums of Canada. The harbor, 90 m. above the influence of the tide, and generally frozen over from December to April, extends for 3 m., and can now admit ships of 3,500 tons burden. It is lined for one mile with limestone wharfs. By the Grand Trunk, Megantic, Intercolonial, Vermont Central, and other railroads, *M.* is connected with every part of Canada and the U. States; and the Allan mail steamers ply weekly between Liverpool and *M.* in summer, and Liverpool and Portland during the winter months. The obstructions in the navigation above *M.* are obviated by the Lachine canal, 9 m. long, 20 feet wide, and 5 feet deep. In 1878 the arrivals from sea were 447 vessels, with 357,668 tons, and the clearances 491, of 382,814 tons. The value of imports in the same year was $46,535,868; and of exports (grain, timber, furs, fish, etc.), $22,362,846. *M.* is the centre of the commerce between Canada and the U. States, carried on by Lake Champlain and the Hudson, and not only is it the depot of all the adjacent country, but most of the business done in Quebec is carried on by branches from the Montreal houses. The principal manufactures are axes, saws, cordage, printing types, india-rubber shoes, chairs, paper, woollens, cotton bags, steam-engines, nails, spikes, joiners' finishings, and flour. Pop. 125,000.

Montrose. See GREAT BRITAIN (SEAPORTS).

Montserrat, a British island of the West In-

dies, belonging to the Leeward group, situated in lat. 16° 45′ N., lon. 62° 20′ W., 27 m. S. W. of Antigua. It is about 12 m. in length, and 8 in breadth; area, 47 sq. m. Capital, Plymouth. About two thirds of the island is mountainous and barren, but the remainder is fertile, and produces some of the best coffee and sugar in the West Indies. Pop. 8,693.

Monument, a column; a memorial of the living or dead; a tomb.

Moochee, an East Indian shoemaker.

Moodah, a bundle or bale of rice in the East, packed in straw or rush-matting, tied with coir.

Moon-Knife, a knife whose blade, sharpened on its convex edge, has a crescent shape. It is used by skinners.

Moon-Sail, MOON-RAKER, a small uppermost sail, occasionally carried by vessels in light winds above the sky-sail.

Moor, to secure a ship by two anchors in nearly opposite directions, so that she *rides* by either in certain winds, or partly by both in other winds. Also, to secure a vessel to weights or chains sunk in harbors for the purpose. These weights are called *mooring blocks*, and the whole apparatus, *moorings*.

Moot, a piece of hard wood, hooped with iron at each end, used in making blocks.

Mop, pieces of cloth, or rope, fastened to a handle, for wiping up wet, or cleaning stones, boards, etc.

Mop-Board, in carpentry, a skirting-board, or wall-board next to the floor of a room.

Mop-Head, a clamp for a mop-rag on the end of a handle.

Mop-Wringer, a contrivance for wringing or squeezing the water from a mop.

Moquette. See CARPET.

Mordant. See DYEING.

Moreen, a kind of worsted stuff, chiefly used for hangings, covering furniture, and ladies' petticoats.

Morel, the smallest and most delicate kind of wild mushroom, the *Morchella esculata*, found in woods.

Morfil, a kind of coarse woollen material used in France for making sacks or bags to contain the oil-cake or flax-seed.

Morgenblatt, MORGEN-ZEITUNG [Ger.], a morning newspaper.

Morgeot. See BURGUNDY WINES.

Morocco, the largest of the Barbary States, situate in the N. W. of Africa, between lat. 27° and 36°, lon. 4° 30′ E. and 11° 50′ W. The Empire or Sultanate consists of the Kingdom of Fez and *M.*, and the territories of Suse, Draha, and Tafilet, which are again subdivided into 33 districts, each under the superintendence of a "Caid"; but the semi-independent tribes are ruled by their own chiefs, and scarcely acknowledge the authority of the Sultan. *M.* contains about 229,000 sq. m., of which the "Tell," or fertile region of the mountains and coast, contains 76,000, the steppe-land 26,000, and the Sahara 128,000, with a population variously estimated at from 2,500,000 to 8,000,000; and, taking the known density of pop. of the neighboring Algeria as measure, it may be fixed, with probably some approximation to truth, at 2,750,000 souls. More than two thirds of the pop. belong to the race commonly known as Moors, the remaining third consisting mainly of Bedouin Arabs, Jews, estimated at 340,000, and negroes. The number of Christians is very small, not exceeding 500. A large part of the interior of *M.* is entirely unknown to Europeans.

Among the chief products of the country are wheat, barley, and maize, oil, esparto-grass, and hemp; among fruits, the fig, almond, pomegranate, lemon, orange, and date are common; but agriculture is greatly neglected. *M.* is said to be rich in mineral treasures: antimony, iron, copper, lead, tin, — the last three in considerable quantities. Gold and silver also are found. Wool is very plentiful. "Printing is unknown, and the architectural skill once characteristic of the race is now but a tradition. Manufacturing industry is almost as degenerate. The most remarkable products are the beautiful and delicate tissues of wool and silk, woven by hand at Fez; the embroideries on velvet and leather; the famous morocco leather, now almost entirely superseded in Europe by the products of the Marseilles tanneries; the carpets and rugs of Rabat and Salé; arms, and silver and gold work. Most of the cities contain tanneries where morocco of different colors is produced, the red and the yellow being of particular excellence. The dyers use cochineal, *rakaut*, and pomegranate skins. The French introduced fuchsine, and for a time it superseded other red dyes, but its use was finally prohibited. At Fez are made and exported large numbers of the red caps which bear the name of that city. Their fine color is produced by a dye made from a berry found in the vicinity. Fez and Tetuan also manufacture bricks, which are sent to all the cities of Morocco, but not in large numbers, for they are used only in the houses of the rich. The best arms are made in Morocco and Tetuan. Jewelry and work in silver and copper are mostly in the hands of the Jews." — (*American Cyclopædia.*) — The maritime commerce, which is wholly carried on by foreigners, is not very considerable, and it has been stationary in recent years. The value of the total imports for the year 1878 was \$5,947,311; of total exports, \$7,581,423. The principal exports are goat-skins, wool, grain, olive-oil, gum, wax,

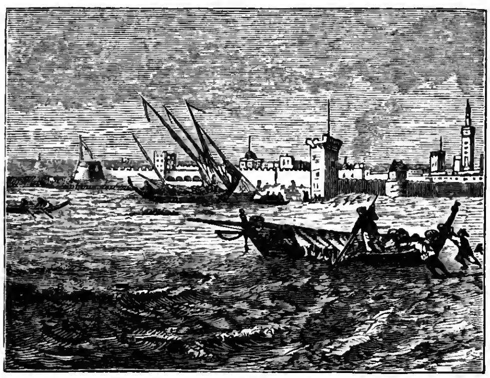

Fig. 359. — MOGADORE.

and almonds; the principal imports are Manchester goods, silver bullion, hardware, tea, and sugar. The inland traffic is inconsiderable, as there are no roads except in the vicinity of the towns, and few of the rivers have bridges; but there is a large trade with central Africa and with the East by caravans.

The foreign trade of *M.* is chiefly with Great Britain, Spain, and France, and it passes mainly through the port of Tangier. The commerce of the U. States with *M.*, which is unimportant, is principally indirect, through the ports of Marseilles and Gibraltar, and is conducted for the most part in French and British bottoms. The imports into the U. States consist of gums, skins, ostrich feathers, etc.; the exports from the U. States to *M.* are raw cotton, brown sugar, rice, tobacco, etc. — The money, weights, and measures of *M.*, with American approximate equivalents, are as follows: —

MONEY.

The *Blankeel*	=	24 *Flues*	=	1½ cents.
The *Ounce*	=	4 *Blankeels*	=	6 cents.
The *Mitkul*	=	10 *Ounces*	=	60 cents.

WEIGHTS AND MEASURES.

The *Kintar*	=	100 *Rotales*	=	112 lb. av.
The *Dhra'a*	=	8 *Tomin*	=	22.482 inches.
The *Saa*	=	4 *Muhds*	=	12.32541 gallons.

Oil is sold by the *kula*, which weighs 22 rotal (of Morocco), and is equal to about 3.335565 gallons, or 15.155 litres, but all other liquids are sold by weight.

M. has three capitals, of which Fez, the chief residence of the Sultan, with a pop. of 88,000, is the principal; Morocco, the old metropolis, 70,000; and Mequinez, 56,000. The two principal ports are Tangier and Mogadore.

Mogadore, or SUIRAH, is the best port on the W. coast of *M.* It is situate on the Atlantic, 130 m. W. S. W. of the city of

Morocco, opposite a strongly fortified island which forms the harbor. In 1878 its exports, chiefly almonds, esparto, olive-oil, orchella-weed, and beeswax, amounted in value to $1,376,665; its imports (cotton, sugar, tea, etc.), to $1,233,430. There entered the port in 1878, 71 vessels, of 25,214 tons, and cleared, 74 vessels, of 26,847 tons. Pop. 20,000.

Tangier occupies an eminence at the western extremity of a capacious bay, within the limits of the Straits of Gibraltar, and nearly opposite to the Spanish town of Tarifa, lat 35° 47′ N., lon. 5° 48′ W. Its harbor, formerly very good, is now so filled up with sand that vessels of more than 400 tons cannot enter it. In 1878 its exports amounted in value to $1,321,822, and its imports to $1,142,761. There entered the port during the same year 553 vessels, of 50,427 tons, and cleared, 531 vessels, of 51,827 tons. Pop. 12,000.

Morocco Leather. See LEATHER.

Morphine, MORPHIA, a vegetable alkaloid procured by a chemical process from opium. It is the narcotic principle of that substance, and is used as an anodyne, etc. When obtained from its alcoholic solution it is in small, brilliant, and colorless crystals, of a very bitter taste. The quantity obtained averages about 1 oz. from the lb. of opium, but it is very variable; the Turkey opium produces the most, and the East Indian and Egyptian the least. See OPIUM.

Imp. duty: *M.* and all its salts, $1 per oz.

Morris and Essex R.R. runs from Hoboken to Phillipsburg, N. J., 84.56 m.; branch from Denville to Hoboken, 36 m.; total length of line, 120.56 m. This Co., whose office is in New York, was chartered in 1835; the main road was completed in 1866, and the Denville branch (through the Bergen tunnel) in 1876. The road was leased in 1868 to the Delaware, Lackawanna, and Western R.R. Co., which, besides assuming all the liabilities of the Co., has agreed to pay 7 % per annum on the capital stock. Capital stock, $15,000,000; funded debt, $19,923,000. Cost of road and equipment, $33,997,956. The statement of funded debt (the bonds of which are assumed and guaranteed by the lessees) was as follows in 1879: —

Character of Bonds	Interest Payable.	When Due.	Amount Afloat.
1st Mortgage....	7 %, May and Nov.	1914	$5,000,000
2d "	7 " Feb and Aug.	1891	3,000,000
Convertible	7 " Jan. and July..	1900	284,000
Construction....	7 " Feb and Aug..	1889	573,000
Consol. Mortgage	7 " April and Oct..	Oct.1, 1909	4,991,000
1st Consol Gen'l Mortgage......	7 " June and Dec..	June 1, 1915	5,050,000
Special Real Estate	Various.	Various	1,025,000

Morse, a name for the walrus, and sometimes applied in trade to the hippopotamus; the teeth of both enter into commerce for ivory purposes.

Morse Alphabet. See TELEGRAPH.

Mort, a three-years-old salmon.

Mortadella, the Italian name for Bologna sausages.

Mortality (Tables of). See LIFE INSURANCE, page 665.

Mortar, a mixture of lime, sand, and water, used for cementing stones and bricks in walls.

In making *M* for ordinary brick-work, rough sand is better than smooth; the quality determines the proportion, which in average way may be stated at 3 sand and 1 lime After a time the two are well worked up together and passed through a wire screen The *M*-mill combines the ingredients by means of a millstone revolving on an iron bed; and there is also used another form of mill, in which rakes are attached to a revolving horizontal wheel. 72 bushels of stone-lime and 18 cubic yards of sand will make 315 cubic feet of *M.* Various other kinds of cement used in the arts, distinct from the lime group, are noticed under CEMENT, GLUE, etc.

Mortar, a vessel, generally in the form of a bell or conical frustum, in which substances are pounded by a pestle. When large, they are made of cast-iron; a smaller size is made of bronze, and those for more delicate pharmaceutical operations are of marble, pottery, porphyry, or agate. They are used in connection with a pestle, which in the larger mortars is of iron, and in the smaller is of porcelain or agate. The Wedgwood ware has long been a favorite for this purpose. The difficulty is to find a material for mortar and pestle which will not scratch. Scratching is abrading, and adds a dust of the material of the mortar to the ingredients under treatment. This may be unimportant in many cases, but sometimes may fatally impair the chemical purity of the substance. *E. H. Knight.* — A gun with a very short and very wide bore. The largest *M.* generally used are 13 inches calibre. *M.* fire off bombs or shells filled with combustibles. The *M.* is fired at a great angle upwards, in order that the shell may fall with crushing force on the enemy's buildings.

Mortgage is a conveyance or transfer of real or personal estate to secure the grantee or assignee the payment of some debt or the performance of some agreement, with a condition or understanding that, in case of the debt being paid, or the agreement being performed, within a certain time, and in the specified manner, the conveyance or assignment shall be void, and the land or personal property revert to, or rather, still belong to the mortgagor. — Leaving aside real estate *M.*, which does not belong to the scope of this work, we exclusively devote the present article to an exposition of the American law on *sale and M. of goods and chattels*, observing that in most of the E., N., and W. States the laws on *M.* are similar in their general character, and that, therefore, the forms herein included are suited to the wants of their business men.

A bill of sale is a written contract, or agreement, transferring and assigning the ownership of personal property, or any interest in the same. If fraudulent, as against third persons, it is void. — Every sale made by a vendor, of goods and chattels in his possession, or under his control, and every assignment of goods and chattels, by way of *M.* or security, or upon any condition whatever, unless the same be accompanied by an immediate delivery, and be followed by an actual and continued change of possession, of the things sold, mortgaged, or assigned, is presumed to be fraudulent and void, as against the creditors of the vendor, or the creditors of the person making such assignment, or subsequent purchasers in good faith; and will be conclusive evidence of fraud, unless it shall be made to appear, on the part of the person claiming under such sale or assignment, that the same was made in good faith, and without any intent to defraud such creditors or purchasers. The term "creditors," as herein used, is to be construed so as to include all the creditors of the vendor, or assignor, at any time whilst such goods and chattels remain in his possession, or under his control. — Continued possession in the vendor, or assignor, is not conclusive evidence of fraud, where the use of the goods and chattels sold, or assigned, or mortgaged, is necessary to such vendor, or assignor, in order to enable him to provide for himself or family, or obtain the means for the payment and satisfaction of his debts. The question of good faith in the transaction, arising from continued possession, is one for a jury to determine; and they have the right, in their discretion, to excuse possession in the vendor, or mortgagor. — Proof of a valuable consideration, or a true debt, is essential to show good

faith; and if such proof be not made, the case will not be given to the jury. — Every *M.*, or conveyance intended to operate as a *M.* of goods and chattels, which shall not be accompanied by an immediate delivery and continued change of possession of the things mortgaged, is absolutely void as against the creditors of the mortgagor, and as against subsequent purchasers and mortgagees in good faith, unless the *M.*, or a true copy thereof, be filed in the town or city where the mortgagor therein, if a resident of this State, resides at the time of the execution thereof; and if not a resident, then in the city or town where the property so mortgaged may be, at the time of such execution. In the city of New York, such instruments are to be filed in the office of the register; in the other cities and county towns of this State, in the office of the county clerk; and in all other towns in the office of the town-clerk thereof. The actual and continued change of possession above mentioned, must be literal, and not a mere legal, or fictitious change, in order to comply with the statute. — Clerks of towns and counties, in whose offices chattel *M.* are required to be filed by law, must enter the names of the mortgagors and mortgagees in every such instrument, in books to be provided by them for the purpose, at the expense of their respective towns or counties, under the head of mortgagors and mortgagees, in each of such books respectively. It is also the duty of the said clerks to number every *M.* or copy so filed, by indorsing the number on the back thereof, and to enter such number in a separate column in the books in which such *M.* are entered, opposite to the name of every party thereto, also the date, the amount secured thereby, when due, and the date of the filing. — Every *M.*, filed according to the foregoing requisitions, ceases to be valid, as against the creditors of the person making the same, or subsequent purchasers or mortgagees in good faith, after the expiration of one year from the filing thereof; unless, within thirty days next preceding the expiration of the said term of one year, a true copy of such *M.*, together with a statement exhibiting the interest of the mortgagee in the property thereby claimed by him, by virtue thereof, be again filed in the office of the clerk, or register, aforesaid, of the town or city where the mortgagor then resides. A copy of such instrument, or any statement therein made, certified by the clerk, or register, as aforesaid, is only evidence of the time of receiving and filing the same, as specified in the indorsement of such clerk, or register. — The words "re-filed and renewed," with the date and signature of the clerk, indorsed on a chattel *M.*, are not sufficient to continue it as against the claims of creditors. The interest claimed by the mortgagee must be distinctly stated. — In Massachusetts, a chattel *M.* must be recorded by the clerk of the town where he transacts his business. The right of the mortgagor, or his assigns, to the property, is not forfeited until 60 days after the mortgagee, or his assigns, gives written notice to the person holding the property of the intention to foreclose, and files a copy of the notice in the clerk's office where the *M.* is recorded. In Maine, a chattel *M.* must be recorded by the clerk of the town where the mortgagor resides, and the mortgaged property must be delivered to the mortgagee, and retained in his possession. — After default in the payment of a chattel *M.*, the mortgagee's title to the property mortgaged becomes absolute at law, and he is entitled to the immediate possession, by filing a copy of the *M.*, with a statement exhibiting the interest claimed by him by virtue thereof, subsequent to such default. When a chattel *M.* contains a provision that, in case of default, the mortgagee *may* sell the property at public or private sale, and out of the proceeds satisfy the debt, and return the surplus, the title of the mortgagee becomes complete, on default, without any sale being made. For the protection of the mortgagor, therefore, a clause of this character, if inserted at all, should be imperative on the mortgagee.

Forms

§ 1. *Common Bill of Sale.*

Know all men by these presents: That I, A. B., of the town of , in the county of , and State of New York, of the first part, for and in consideration of the sum of dollars, lawful money of the U. States, to me paid by C D., of, etc., of the second part, the receipt whereof is hereby acknowledged, have bargained and sold, and by these presents do grant and convey unto the said party of the second part, his executors, administrators, and assigns, the one equal, undivided half, of six acres of wheat, now growing on the farm of E F , in the town of , aforesaid, one chestnut horse, and twenty sheep belonging to me, and now in my possession, at the place last aforesaid: to have and to hold the same unto the said party of the second part, his executors, administrators, and assigns, forever. And I do, for myself, my heirs, executors, and administrators, covenant and agree, to and with the said party of the second part, his executors, administrators, and assigns, to warrant and defend the sale of the said property, goods, and chattels, hereby made, unto the said party of the second part, his executors, administrators, and assigns, against all and every person and persons whomsoever

In witness whereof, I have hereunto set my hand and seal, this day of , one thousand eight hundred and .

Signed, sealed, and delivered, in presence of G. H. } A. B. [L. S.]

§ 2. *Bill of Sale and Chattel Mortgage.*

Know all men by these presents: That I, A. B., of, etc., in consideration of one dollar to me paid, by C. D., of, etc., the receipt whereof I hereby acknowledge, have, and by these presents do grant, bargain, sell, assign, transfer, and set over, unto the said C. D. and his assigns, forever, the following goods, chattels, and property, to wit [*specify the articles as in* § 1, *or refer to them in a schedule annexed*]: Whereas I, the said A. B., am justly indebted to the said C. D., in the sum of one hundred and ten dollars, on account, for money had and received, and goods sold and delivered [*or*, on a promissory note, dated, etc., and due months from date], to be paid to the said C. D., or his assigns, on the day of , 18 , with the legal interest thereon from the day of the date hereof:

Now the condition of the above bill of sale is such, that if the said A. B. shall well and truly pay to the said C. D., or to his agent, attorney, or assignee, the above-mentioned demand [*or*, demands], at the time, and in the manner and form above expressed, and shall keep and perform the covenants and agreements above contained, on his part to be kept and performed, according to the true intent and meaning thereof, then the above bill of sale shall be void: Otherwise, on the neglect and failure of the said A. B. to pay the said demand [*or*, demands], or to keep and perform the said covenants and agreements as above expressed, then, and in that case, the said C D and his assigns are hereby authorized and empowered to sell the above described goods, chattels, and property [*or*, the goods, etc., described in the schedule hereunto annexed, as aforesaid], or any part thereof, at public or private sale, at his or their option, and to retain from the proceeds of such sale, in his or their hands, sufficient to pay and satisfy the whole amount of the above-mentioned demand [*or*, demands], with the legal interest thereon which shall be due at the time of such sale, and all costs, charges, and expenses, incurred by the said C D., or his assigns, in consequence of the neglect and failure of the said A B., as aforesaid; rendering the overplus, if any, to the said A B , or to his heirs, executors, administrators, or assigns, on demand. [The said C. D. and his assigns are hereby authorized, for further security, to take the said goods, chattels, and property, into his or their possession, at any time he or they may think proper.]

In witness, etc. [*as in* § 1].

§ 3. *Common Chattel Mortgage.*

This indenture, made the day of, etc., between A B., of, etc , of the first part, and C. D., of, etc , of the second part, witnesseth: That the said party of the first part, in consideration of the sum of dollars, to him duly paid, hath sold, and by these presents doth grant and convey, to the said party of the second part, and his assigns, the following described goods, chattels, and property [*describe them particularly, as in*

§ 1, *or refer to them in a schedule annexed*], now in my possession at the of , aforesaid; together with the appurtenances, and all the estate, title, and interest, of the said party of the first part therein.* This grant is intended as a security for the payment of one hundred and ten dollars, with interest, on or before the expiration of one year from the date hereof; and the additional sum of one hundred and forty dollars, with interest, on the day of , 18 ; which payments, if duly made, will render their conveyance void. [*The sentence near the close of* § 2 *included in* [] *may be added, if necessary.*]

In witness thereof, the said party of the first part hath hereunto set his hand and seal, the day and year first above written.

Signed, sealed, and delivered, In presence of G. H. } A. B. [L. S.]

§ 4. *Chattel Mortgage to secure a Note.*

This indenture, made, etc., [*as in* § 3 *to the**, *and then add*:] Provided, nevertheless, that if the said party of the first part shall well and duly pay unto the said party of the second part, or his assigns, at maturity, the full amount, principal, and interest, of a certain promissory note, executed by the said party of the first part, for the sum of dollars, bearing date the day of , 18 , payable three months after date, and now held by the said party of the second part, then this conveyance shall be void; otherwise to remain in full force and effect. [*Add clause in regard to default, and possession, if necessary.*]

In witness, etc. [*as in* § 3].

§ 5. *Chattel Mortgage requiring Sale to be made.*

This indenture, made, etc., [*as in* § 3 *to the words*, "In witness whereof, etc.," *and then add*:] But if default shall be made in the payment of the principal or interest above mentioned, or any part thereof, then the said party of the second part, and his assigns, are hereby required to sell the goods, chattels, and property, above granted, at public auction, after giving notice thereof in the manner provided by law for constable's sales, and out of the proceeds to satisfy the amount then due to the party of the second part, or his assigns, with the costs and expenses incurred by reason of such default, and return the surplus, if any there be, to the said party of the first part, or his personal representatives.

In witness, etc. [*as in* § 3].

§ 6. *Chattel Mortgage to secure a Debt.*

Whereas I, A. B., of the town of , in the county of , and State of , am justly indebted unto C. D., of, etc., in the sum of dollars, on account, to be paid on or before the day of next, with interest from this date: Now, therefore, in consideration of such indebtedness, and in order to secure the payment of the same, as aforesaid, I do hereby sell, assign, transfer, and set over, unto the said C. D., the property mentioned and described in the schedule hereinunder written; Provided, however, that if the said debt and interest be paid, as above specified, this sale and transfer shall be void; and this grant is also subject to the following conditions: —

The property hereby sold and transferred is to remain in my possession until default be made in the payment of the debt and interest aforesaid, or some part thereof, unless I shall sell, or attempt to sell, assign, or dispose of, the said property, or any part thereof, or suffer the same unreasonably to depreciate in value; in which case the said C. D. may take the said property, or any part thereof, into his own possession.

Upon taking said property, or any part thereof, into his possession, either in case of default, or as above provided, the said C. D. shall sell the same at public or private sale; and after satisfying the aforesaid debt and the interest thereon, and all necessary and reasonable costs, charges, and expenses incurred by him, out of the proceeds of such sale, he shall return the surplus to me or my representatives.

Witness my hand and seal, this day of 18 .

A. B. [L. S.]

SCHEDULE ABOVE REFERRED TO.

[*Insert the articles, and let the mortgagor sign his name at the foot of the list.*]

§ 7. *Statement to be filed with the Copy, within thirty days next preceding the expiration of the year.*

County, } ss:
Town of , }

I, C. D., the mortgagee [*or*, E. F., the assignee of C. D., the mortgagee], named in the within [*or*, annexed] instrument, do hereby certify, that the sum of ninety-seven dollars and ten cents is claimed by me to be due thereupon, at the date hereof; which sum constitutes the amount of my interest in the property therein mentioned and described. Dated the day of , 18 .

In presence of F. E. } C. D., Mortgagee [*or*, E. F., Assignee].

§ 8. *Notice of Sale on Chattel Mortgage.*

By virtue of a chattel mortgage by A. B. to C. D., dated the day of , 18 , and filed in the Register of the city of [*or*, the County Clerk of the county of ; *or*, the Town Clerk of the town of], on the day of , in the year aforesaid, and upon which default has been made, I shall sell the property therein mentioned and described, viz.: [*mention the articles*] at public auction, at the house of , in the city [*or*, town] of aforesaid, on the day of , instant [*or*, next], at ten o'clock in the forenoon of that day. Dated at , the day of , 18 .

C. D., Mortgagee [*or*, E. F., Assignee].

Mortgagee, the person who holds a mortgage.

Mortgagor, MORTGAGER, the person who grants a mortgage.

Mortise, in carpentry and joinery, a rectangular cavity in a piece of wood, into which a corresponding projecting piece or *tenon* may be introduced. In some cases the cavity is terminated by a semi-cylindrical end, and then a slot-boring instead of a mortising tool is best fitted for making it. Usually, however, the use of a square hole and square tenon is preferred. Until recent years this kind of work was always done by hand; but the invention of wood-working machinery has placed much more efficient means at the disposal of the carpenter.

There are many kinds of *mortising machines*, one of which, invented by Worssam, cuts both a *M* cavity and a slot-bore. It consists of a hollow square chisel, into which a screw auger turns at the rate of 1,500 revolutions per minute; the auger bores a hole the intended width of the *M.*, and then the square chisel follows to square up the hole. By its rapid turning, the screw of the auger brings up the chips produced by its own action, together with those caused by the four cutting edges of the chisel, and clears them out through long slots near the middle of the hollow chisel. In this way the tool makes a clean square hole in wood either hard or soft; and mortises of any length may be formed by a succession of such holes.

Mortise-Chisel, a stout chisel of different kinds, square, round, or pointed, driven by a mallet, and used to make mortises in framing.

Mortising-Machine. See MORTISE.

Mortling, pelt wool; wool from the fleece of a dead sheep.

Mosaic [Fr. *mosaïque*; Ger. *Mosaisch*]. There are several kinds of *M.*, but all of them consist in imbedding fragments of different colored substances, glass, enamel, marble, stone, or terra-cotta, in a cement so as to produce the effect of a picture.

M.-work is of great antiquity; and it is believed to have had its origin in Asia. In Greece, during the time of Alexander, *M.* pavements, made with variously colored marble, were among the sumptuous decorations of the period. The art was carried from Greece by workmen to Rome, where it acquired universal popularity, and soon came to be applied, not only to floors, but also to walls and ceilings. In Italy, and in most of the countries occupied by the Romans, many floors ornamented with *M.*-work have been found among old ruins. They consist generally of a centre-piece, frequently of human beings or animals, with a border or frame of a regular pattern. The different parts of which the *M.* is formed consist of cubes of different colored stones or earthenware, cemented together. Some exquisite specimens of this kind of *M.*-work have been found at Pompeii. In the 5th century, when the arts and sciences were driven from Italy, the art of *M.*-work was preserved by the Byzantine Greeks. It attained its highest perfection at the beginning of the 17th century, when Clement VIII. had the whole of the interior of the dome of St. Peter's ornamented with *M.*-work. Giambattista Calandra

improved *M.* by the introduction of a new cement. He and other artists who followed after him employed the art for copying original paintings by celebrated artists. One of the great advantages of this kind of work is its wonderful power of preservation, by which many of these paintings are represented in all their original freshness and beauty. A school for *M.* was founded at the beginning of the 18th century in Rome, by Peter Paul of Christopheris; and many of his pupils carried the art to a high degree of excellence. In modern times, two kinds of *M.* are particularly famous, — the Roman and the Florentine. In Roman *M.* the pictures are formed by joining very small pieces of stone, which gives greater variety, and facilitates the representation of large paintings. In the Florentine style, the *M.* is made of large pieces of stone, and is consequently more troublesome, and only adapted for small paintings. The Italians call *M.*-work in wood *tansia* or *tarsia;* the French, *marqueterie.* In the most costly *M.*, precious stones have been cut to furnish materials; but in common works of this art, enamels of different colors, manufactured for the purpose, are the materials employed.

Imp. duty: *M.* pictures, of marble, 50 per cent.; Florentine *M.*, so styled, of slate, 40 per cent; real *M.*, not set, 10 per cent; set, 25 per cent; *M.* in settings or frames not of metal, 20 per cent.

Mosaic Gold, a compound of tin with mercury and sulphur, extensively employed as a substitute for gold-leaf in the manufacture of cheap picture-frames, and in ornamental paper-work. The term has also been applied to a superior kind of brass, and to a yellow alloy of copper, zinc, and gold. The name is also given to bronze powder. — *T. McElrath.*

Mosaic Wool-work, a remarkable mode of making carpets, rugs, and other fabrics, by minute portions of wool arranged in a definite pattern.

Threads of wool, all equal in length, are stretched horizontally in a frame, nearly close together, both vertically and horizontally, to form a compact mass. They are of various colors, and the colors are arranged in conformity with a pattern which is placed close at hand. The threads are then cut across so as to form cubical masses, all the threads in each cube being kept rigidly in their places. The cube is placed in a frame, with the threads vertical; a clean horizontal cut is made at the top, to bring the surface level and smooth; it is wetted with india-rubber solution, and a piece of canvas is well cemented down upon it. When this is dry, a carefully adjusted machine cuts off a horizontal slice, an eighth or a quarter of an inch in thickness. The block will yield slice after slice similar to it, — a cementing on of a new backing of canvas, and a process of drying preceding the cutting of each slice. The cube or block has a slight movement upwards given to it after each slicing, to regulate the exact thickness of the next following slice, as in cutting tobacco or chaff. This principle, the cementing of a slice of fibres to a backing of canvas, may be varied in an infinity of ways. The fibres may be of wool, cotton, silk, flax, gold, or silver threads, or any two or more of these combined. The threads may be stretched out to any length that the mechanism of the apparatus will permit; and there may be any number massed together in breadth and depth. The colors may be chosen so as to give merely a simple device, or they may imitate all the elaboration of a picture. The slices may be so thin as to form a mere nap, or so long as to form a rich, soft pile. The backing may be of canvas, or of any textile material at pleasure. All these are matters of detail. Imitations of Wilton carpets, Crossley's beautiful mosaic rugs and railway wrappers, and nap for silk hats have been made in this way.

Moselle Wines. See GERMANY (WINES OF).

Moslings, a name for the thin bibulous shreds of leather shaved off by the currier in dressing skins.

Moss. The New Orleans long moss is the produce of *Tillandsia usnoides:* it possesses considerable elasticity, is prepared as a substitute for horse-hair in upholstery purposes, and is used by naturalists for stuffing birds.

Moss-Agate. See MOCHA-STONE.

Mote, an imperfection in wool, which has to be cleansed of burrs and motes by machine.

Mother, dregs, lees, or feculencies; a thick slimy substance found in liquors.

Mother-Cloves, a name in the East for the fully expanded flower-buds of the *Caryophyllus aromaticus*, which, when they thus reach maturity, are only fit for seed or for candying.

Mother-of-Pearl [Fr. *nacre de perles;* Ger. *Perlen Mutter*], the hard, silvery, brilliant internal layer of several kinds of shells, particularly oysters, which is often variegated with changing purple and azure colors. The large oysters of the Indian seas alone secrete this coat of sufficient thickness to render their shells available to the purposes of manufacturers. The genus of shell fish called *pentadinæ* furnishes the finest pearls, as well as mother-of-pearl; it is found in greatest perfection round the coasts of Ceylon, near Ormus in the Persian Gulf, at Cape Comorin, and among some of the Australian seas. The brilliant hues of mother-of-pearl do not depend upon the nature of the substance, but upon its structure, the microscopic wrinkles or furrows which run across the surface of every slice acting upon the reflected light in such a way as to produce the chromatic effect. Mother-of-pearl is very delicate to work, but it may be fashioned by saws, files, and drills, with the aid sometimes of a corrosive acid, such as the dilute sulphuric or muriatic; and it is polished by colcothar of vitriol. It is used for buttons, handles, inlays, and countless articles of ornament. There are several commercial varieties: the white, which comes from China and Singapore; the yellow edge, from Manilla; a very pure white from Bombay and South America, and the black from the South Sea Islands.

Imp. duty: shells, free; buttons, with metal eyes or shanks, 30 per cent; all other manufactures, n. o. p. f., 35 per cent.

Motion, the moving part of a watch, or of machinery. — The cross-head, cross-head guides, and blocks, in a locomotive steam-engine, taken collectively.

Motor, in mechanics, a prime mover; that which gives motion; the motive of mechanical action.

Motto, a sentence, emblem, or device.

Motto-Kisses, sweetmeats having poetry, mottoes, etc., rolled up in fancy papers for the amusement of a party.

Mould, Mold, the matrix in which an object is cast; a shape for confectionery, etc.

Mould-Board, the part of a plough above the share, which turns over the earth or lays the furrow-slice.

Moulder, a founder; a former, or shaper.

Moulding, a small border or edging to a panel or to a picture-frame. — The process of casting, pressing, or stamping in moulds.

Moulding-Mill, a saw-mill or shaping mill for timber.

Moulin [Fr.], a mill. *A moulin à vent* is a windmill.

Moulin-à-vent. See BURGUNDY WINES.

Moulinage [Fr.], the last dressing of silk before it is dyed.

Mountain. See SPAIN (WINES OF.)

Mountain Blue and Green. See BICE.

Mountain Cork, MOUNTAIN LEATHER, a kind of asbestos so light as to float in water, and in which the fibres are so interlaced as not to be apparent; in feel and texture it resembles cork.

Mountain-Dew, pure Scotch Highland whiskey.

Mountain-Tea, the leaves of a small evergreen trailing plant, the *Gaultheria procumbens*, used in some parts as a substitute for tea.

Mountain-Rice, an upland description of rice, grown without irrigation.

Mounting, the setting of a gem. — The frame to a picture. — The harness or tackle used in weaving.

Mount Scharlachberg. See GERMANY (WINES OF).

Mourning-Store, a store where are sold mourning goods, such as black bombazine, black crape, black hose and gloves, white lisse, and black, and white and black fabrics generally.

Mouse, to wrap a hook and its standing part with yarn to prevent its slipping.

Mouse-Trap, a trap baited to catch mice.

Mousseline [Fr.], muslin.

Mousseline-de-Laine, a fine, thin muslin of wool, woven in the gray and colored in the piece, manuf. in France, much used for the dress of ladies, and found in all colors. An inferior fabric bearing the same name, and of similar appearance, though composed of wool mixed with cotton, is extensively made in England and in the U. States.

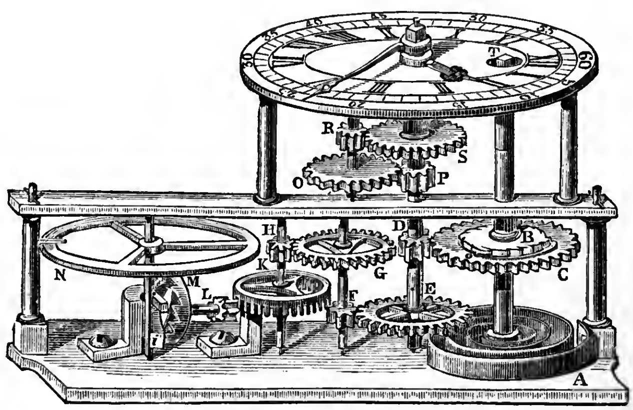

Fig. 360. — MOVEMENT OF A WATCH.

Mouth, the opening or orifice of a vessel, by which it is filled or emptied. — The part or channel of a river by which its waters empty into the ocean, or into a lake, or into another river. — The aperture of a piece of ordnance, by which the charge is issued. — The opening or entrance of a cave, pit, well, or den. — In joinery, the slot in a plane to receive the bit. — The cross-bar of bridle-bit.

Mouth-Glass, a small hand-mirror for inspecting the teeth and gums, etc.

Mouthpiece, the part of a musical wind-instrument applied to the lips.

Mouth-Pipe, an organ pipe having a lip to cut the wind escaping through an aperture in a diaphragm.

Movables, dress and personal goods, household furniture, books, farming stock and implements; things that can be moved.

Movement, the train of wheel-work of a watch or clock.

Fig. 360 shows the movement of a watch with vertical escapement, of which has been removed the barrel containing the mainspring and the fusee. One end of the mainspring, A, is fast to a pillar and the other to the winding-stem T, which carries a ratchet-wheel, B, provided with a click, *o*, and also the spur-wheel, C. When the watch is wound up, the spring is condensed, and through the medium of the click operates to rotate the winding-stem, — the wheel, C, on which turns a pinion, D, and through it the wheel, E, which gears with a pinion, F, causing the movement of the wheel, G, rotating a pinion, H, on the shaft of the crown-wheel, K, which turns the pinion, L, of the scape-wheel, M. The teeth of this are alternately engaged by and released from two pallets, *i*, *i′*, on the axis or *verge* of the balance-wheel, N, causing it to oscillate back and forth to an amount determined by a stop, so as to perform a uniform number of oscillations in a given time, thus regulating the movement of the works. The shaft of the wheel, E, prolongs itself upwardly, and passing through the hollow shaft of the wheel, S, carries the minute-hand at its upper end. It also carries a pinion, P, which engages a wheel, Q, on an upright shaft turning a pinion, R, which gears with the wheel, S, on the hollow shaft which carries the hour-hand. The number of teeth in the various wheels and pinions bear such relations to each other, that when the balance-wheel and escapement are in adjustment, the minute-hand shall be carried around the dial in exactly one hour, while the hollow shaft of the wheel, S, rotates but $\frac{1}{12}$ as fast, carrying the hour-hand round but once in 12 hours. — *E. H. Knight.*

Mower. See REAPER.

Moxa, a cottony substance prepared by the Chinese and Japanese, by beating the dried leaves of the *Artemisia moxa*. It is used as a cautery by placing a small cone of it on the skin, and then setting fire to it. On burning down to the part on which it rests, it makes a sore, which is kept open if requisite. It is principally used in cases of gout or rheumatism. — Any substance which, by gradual combustion near the skin, is employed as a counter-irritant.

Mozambique, a large extent of seaboard territory on the E. coast of S. Africa, belonging to Portugal, and extending from Cape Delgado, in lat. 10° 41′ S., to Delagoa Bay, lat. 26° S.; area, 382,683 sq. m. The shores are generally high and abrupt, but the country along the coast is level and fertile. The principal rivers are the Zambesi and Sofala. Considerable tracts are cultivated and yield abundant crops of rice and wheat. Gold and copper are found, and pearl-fishing is a source of considerable profit. The principal exports are rice, gold-dust, honey, tortoise shell, amber, etc. The climate is hot and unhealthy. Pop. 300,000.

Mozambique, the cap. of the above territory, is situated in lat. 15° 3′ S., lon. 40° 48′ E., on a coral island which is about 1½ m. in length, near the entrance of a deep inlet of the sea, which forms its harbor. The harbor is commodious, but its trade, which was formerly very extensive, has very much declined since the rise of Zanzibar. Pop. 7,000.

Mozambique, a stuff for ladies' dresses, having a chain, in which the cotton threads are associated in pairs, and the woollen filling is soft and fleecy. It is dyed in the wool, self-colored, and striped in the warp.

Mozing, an operation in preparing cloth in the gig-mill.

Mucilage, a substance which water, heated to 160° or 180°, extracts from certain seeds or roots, when they are infused in it, and then subjected to pressure in a linen strainer; when the liquor is evaporated, the residue resembles gum. When bruised linseed is thus treated, it yields a mucilaginous solution, which is precipitated by acetate and sub-acetate of lead, by chloride of tin, and by alcohol. Quince-seed furnishes a similar solution. The mucilage appears to reside in the husk or outer coating of the quince-seed; it is used by

ladies, under the name of *fixature*, to retain the hair in curl. — Also, a solution of gum, or other adhesive substance, used for cementing envelopes, documents, etc.

Mud-Cart, a scavenger's cart for removing filth from the streets.

Mudde, Muid, a Dutch and Belgian grain-measure, corresponding to the French hectolitre, and equal to 2.7522 bushels, but variable.

Muet, a white sulphuretted wine, made in Languedoc, France, which never ferments, and is used to mix with other wines.

Muff, a soft cover of fur or feathers, etc., to wrap the hands in. — A roller or cylinder of glass for flattening out into a glass plate. — A joining tube driven into the ends of two adjoining pipes.

Muffineer, a covered dish to keep toasted muffins hot.

Muffle. See ASSAY.

Muffler, a throat-wrapper, made of tartan, woollen, or some other warm or soft material. — In music, a soft cushion employed to terminate or soften a note.

Mug, properly a jug or vessel without a lip; but indifferently applied to both.

Muid, a Dutch grain-measure. See MUDDE.

Mukuee, the Hindustani name for Indian corn or maize.

Mulberry, a tree of which there are many species, composing the order *Moraceæ*. The mulberries are natives of the East, but they inhabit the temperate and tropical regions of both hemispheres. Some species are cultivated for their fruit; others, for the leaves, which form the food of silk-worms.

Fig. 361. — BLACK MULBERRY.

The *black mulberry* (*Morus nigra*), which is seldom more than 30 feet high, grows in almost any soil or situation that is tolerably dry, and in any climate not much colder than that of New York. It is very easily propagated by truncheons or pieces of the branches, eight or nine feet in length, and of any thickness, being planted half their depth in tolerably good soil, when they will bear fruit the following year. As it is extremely tenacious of life, every part of the root, trunk, boughs, and branches may be converted into plants by separation; it may also be increased from seeds, by layers, or by grafting and budding. This tree, from its slowness of putting out its leaves, being rarely injured by spring frosts, and its leaves being seldom or never devoured by any insect, except the silk-worm, and never touched with mildew, very seldom fails to produce a good crop of fruit. This fruit, however, though excellent, and exceedingly wholesome, does not keep, and is so far troublesome, that it is only good when it is quite ripe and is best when it is suffered to fall from the tree itself. As a standard tree, whether for ornament or fruit, the mulberry requires very little pruning or attention of any kind. As it increases in age it increases in productiveness, and in full-grown trees the fruit is much larger and better flavored than in those which are young. The tree, in every part, contains a milky juice, which, being coagulated, is found to form a coarse kind of elastic gum. The fruit of this tree, much larger and finer than that of our native species, is of an agreeable acid and aromatic flavor, and is eaten raw in England, as a dessert, or is formed into an agreeable preserve. When ripe, it is regarded as cooling and laxative, allaying thirst, and being grateful in cases of fever. When made into a sirup, it is considered excellent for a sore throat. The wood of this tree is only good for fuel.

The *white mulberry* (*Morus alba*) and its variety (*M. alba multicaulis*) are readily distinguished by their obliquely heart-shaped leaves, and their generally yellowish white fruit, which is mawkishly sweet and without flavor. While silk-worms will feed upon the leaves of other species, none produce silk of so fine quality as those kept upon the leaves of the white mulberry. The wood, when dry, weighs 44 lbs. to a cubic foot. In France, the principal use of that of the trunk is for various purposes of turnery and carpentry, and for the making of wine-casks, for which it is highly valued, as it is said to impart an agreeable violet-like flavor to white wines. The branches are used for vine-props, posts and rails to rural fences, and for fuel. The bark may be converted into linen of the fineness of silk. For this purpose the young wood is gathered in August, during the second ascent of the sap, and immersed for three or four days in still water. It is then taken out at sunset, spread on the grass, and returned to the water at sunrise. After repeating this process daily for some time, it is finally taken out, dried, and prepared like flax. The bark, and more especially the leaves of the white mulberry, abound in a milky juice, which is found to possess more or less of the properties of caoutchouc, according to the climate in which the tree is grown. It is doubtless owing to this property in the leaves of the mulberry that the cocoons of the silk-worm have so much more tenacity of fibre than those of any other insect that feeds on the leaves of trees. Hence, also, the silk, like the tobacco and wine of warm climates, and of poor, dry soils, is always superior to that produced in colder climates, and from rich and moist soils. To verify this opinion, we quote the following very judicious observations from the *Journal d'Agriculture de Pays-Bas*, which will not only show the impracticability of profitably raising silk in the higher latitudes, but will serve as an infallible guide in the choice of a soil and climate for this species of agriculture: "The mulberry-tree is found in different climates; but the juice of the leaves grown in the north is much less suitable for the production of good silk, than that of the leaves of the south. In this respect, mulberry leaves and silk differ as much as wines, according to the climate and soil in which they are produced. In general, every climate and soil that will grow good wheat will produce large, succulent mulberry leaves; but these leaves will, in many cases, be too nutritive: that is, they will have too much sap, and too much substance and succulency. The wild mulberry, with small leaves, answers better, for such a soil, than the grafted mulberry, with large leaves. A general rule, and one to be depended on, is, that the mulberry, to produce the best silk, requires the same soil and exposure that the vine does to produce the best wine. Experience has proved that silk-worms nourished by leaves gathered from a dry soil succeed much better, produce more cocoons, and are less subject to those diseases, which destroy them, than those which have been nourished by leaves produced by an extremely rich soil." See SILK.

The *red mulberry* (*Morus rubra*) is an American species, found from New England southward. Its perfect wood, which is fine-grained and compact, though light, is of a yellowish hue, approaching to lemon-color. It possesses strength and solidity, and, when properly seasoned, it is almost as durable as that of locust, to which, by many persons, it is esteemed equal. In the dockyards at Philadelphia, Baltimore, and the more southern ports it is employed in the construction of both the upper and lower frames of vessels, for knees, floor-timbers, etc.; and is preferred to every other kind of wood for tree-nails, except that of the locust. In Charleston, S. C., it is sometimes selected for the ribs of large boats. It is also used, in the parts of the country where it abounds, for the posts of rural fences, which, from their durability, are as much esteemed as those of the locust. As the leaves of this species are thick, rough, and hairy, while young, they are improper for the food of silk-worms, which feed with advantage, in a cold climate, only on the *Morus alba*, or some of its varieties. The red mulberry is well deserving of cultivation, both from its thick and shady foliage, and the agreeable flavor of its dark-red fruit.

The *paper mulberry* (*Broussonetia papyrifera*), which grows wild in Japan and China, has long been cultivated in New York and southward as a shade-tree. It is a small, quick-growing tree, 20 or 30 feet high. The wood, which is soft, spongy, and brittle, is of little value except for fuel. The leaves are too rough and coarse, in their texture, for the food of silk-worms; but they are found to be excellent fodder for cattle; and as the tree will grow rapidly in almost every soil, and throws out numerous tufts of leaves, it has been suggested that it might be valuable to cultivate, in some situations and climates, for that purpose. The juice of this tree is sufficiently tenacious to be used in China as a glue, either in gilding leather or paper. The

finest and whitest cloth worn by the inhabitants of the Sandwich Islands is made of its bark The principal use, however, to which this tree appears to be applied by the Japanese, is for the manufacture of their paper. For that purpose branches of the current year, being cut into pieces about a yard long, are boiled until the bark shrinks from the wood, which is taken out and thrown away; and the bark, being dried, is preserved till wanted In order to make paper, it is soaked for three or four hours in water; after which the external skin and the green internal coat are scraped off, and the strongest and finest pieces are selected; the produce of the younger shoots being of an inferior quality. If any very old portions present themselves, they are, on the other hand, rejected as too coarse. All knotty parts, and everything which might impair the beauty of the paper, are also removed. The chosen bark is boiled in a lixivium till its downy fibres can be separated by a touch of the finger. The pulp, so produced, is mixed with mucilage and spread upon frames of rushes to dry. The paper used by engravers to take proofs of their work, commercially called India-paper, is also obtained from this bark.

Mulch, half-rotten straw, litter, etc.

Mulct, to stop wages; to inflict a fine or penalty.

Mule, a quadruped springing from the union of the male ass with the mare, or of the horse with the female ass, — the former being the best. The *M.* is commonly found to be vicious, stubborn, and obstinate, to a proverb; but it is hardy, and valuable for its sureness of foot. It is also useful on account of the great load which it can carry. Hence its common use in some parts of Spain, in Mexico, South America, and in other mountainous countries without good roads. The *M.* is longer-lived than either the horse or the ass. The following table shows the number, value, and average price of *M.* in the U. States in 1880: —

States.	Number.	Average price.	Value.
Maine	....	....	....
New Hampshire	....	....	....
Vermont	....	....	....
Massachusetts	....	....	....
Rhode Island	....	....	....
Connecticut	....	....	....
New York	11,800	$83 59	$986,362
New Jersey	14,400	104 27	1,501,488
Pennsylvania	24,900	79 82	1,987,518
Delaware	4,000	84 35	337,400
Maryland	11,300	85 14	962,082
Virginia	30,600	63 48	1,942,488
North Carolina	74,000	60 19	4,454,060
South Carolina	51,500	79 57	4,097,855
Georgia	97,200	71 86	6,984,792
Florida	11,900	66 36	789,684
Alabama	111,700	54 28	6,063,076
Mississippi	100,000	63 47	6,347,000
Louisiana	80,700	58 82	4,746,774
Texas	180,200	40 23	7,249,446
Arkansas	89,300	51 59	4,606,987
Tennessee	99,700	49 41	4,926,177
West Virginia	2,400	49 96	119,904
Kentucky	117,800	44 05	5,189,090
Ohio	26,700	59 44	1,587,048
Michigan	4,300	87 23	375,089
Indiana	61,200	51 13	3,129,156
Illinois	138,000	53 13	7,331,940
Wisconsin	8,700	76 29	663,723
Minnesota	7,000	79 02	553,140
Iowa	43,400	66 03	2,865,702
Missouri	191,900	43 38	8,324,622
Kansas	50,000	63 24	3,162,000
Nebraska	13,600	87 45	1,189,320
California	25,700	66 24	1,702,368
Oregon	3,500	50 91	178,185
Nev., Col., and the Territories	25,700	65 35	1,679,495
Total	713,100	....	$96,033,971
Grand average of prices.	....	$56 06	....

Mule, MULE-JENNY. See COTTON, page 232.

Mule-Load, the travelling burden for a mule; in South America the medium pack-load for a mule is 270 lbs.

Mule-Spinner, a machine-spinner.

Muleteer, a driver of mules.

Mulette, a Portuguese vessel which has three lateen sails.

Mule-Twist, yarn made by the mule or spinning-jenny, of which there are best, seconds, and common seconds.

Muley, a mill-saw whose reciprocating motion is very rapid, being not strained in a *gate* or *sash*, and having guide-carriages above and below, called *muley-heads.*

Mull, a very thin and soft muslin, used for dresses and trimmings, of which there are several kinds made, under the names of Swiss mulls, India mulls, starched-mulls, etc. — A snuff-box made of a ram's horn. — A powder formed by pounding the very small roots and husks of bark of large madder. See MADDER.

Mulled Wine, wine heated over the fire, with sugar and spices added.

Muller, a hand-stone for grinding down oil paint on a slab, or corn by natives. — A vessel for heating wine over a fire.

Mullet, a sea-fish, of which there are several species belonging to two genera, the red and the gray mullets. To the former belongs the bearded mullet, *Mullus barbatus*, the *rouget* of the French, which is still as esteemed as it was among the Romans. Among the latter is the American striped mullet, *Mugil lineatus*, a fish prized by epicures, which ranges from New York southward, and is in season in early autumn. It is 6 or 8 inches long, with 10 or 12 dark brown longitudinal stripes, and abdomen pearl-gray.

Mullion, the upright bar dividing the lights of a window.

Mulse, wine boiled with honey.

Multiplying-Glass, one with a number of facets, which repeats the same object several times at once.

Multiplying-Wheel, a wheel which increases the number of movements in machinery.

Multum, a name under which a stupefying mixture of *Cocculus Indicus* and other ingredients, for adulterating beer, is sold.

Multure, a toll for grinding; grist.

Mum, a kind of spruce beer, or ale brewed with wheat, oat malt, and ground beans, and flavored with aromatic herbs. It requires to be stored about two years.

Mummy, a dead human body embalmed and preserved, kept in museums, or the cabinets of the curious.

Mundic, iron or arsenical pyrites.

Mundil, an embroidered turban richly ornamented in imitation of gold and silver.

Mungo, woollen cloth manufactured from old wool obtained from the rags of heavy fabrics, the rags being torn into fibre by cylindrical machines armed with teeth. This cloth gives substance and warmth, and is capable of a fine finish, but from the shortness of the fibre is weak and tender. It is chiefly used for padding, linings office-coats, druggets, and blankets. Broadcloth is sometimes made with a large admixture of this cheap and inferior material.

Munich. See BAVARIA.

Munjeet, the commercial name for the root of an East Indian plant, the *Rubia munjista*, used as a red dye. It is very similar to madder, and is often used as a substitute for it.

Imp. duty. See MADDER.

Munjistine, a coloring matter obtained from munjeet by a series of chemical processes of somewhat elaborate kind. It is an orange color-

ing substance, and exists with purpurine in munjeet. It gives a bright orange dye to cloth which has been mordanted with alumina; a brownish-purple color with an iron mordant; and a deep orange-color with a Turkey-red mordant. The red obtained by munjeet derives its scarlet tint from munjistine. The colors are moderately permanent, and bear washing well.

Muntz's-metal, a composition for sheathing, etc., consisting of 50 per cent of copper, 41 of zinc, and about 4 of lead, named after its inventor, the late Mr. Muntz of Birmingham, England.

Mural Circle, an astronomical instrument, usually of large size, consisting of a graduated circle, furnished with a telescope, attached to a stone wall or pier of solid masonry, and fixed in the meridian, for the purpose of measuring the distance of stars from the pole or the zenith.

Murex, the handsome shell of a mollusc, many varieties of which are esteemed by collectors. Some species of *Murex* and *Purpura* yielded the Tyrian purple dye of the ancients.

Murexide is a dye material prepared by a somewhat complicated process from the uric acid contained in guano and other substances. Chemically it is a purpurate of ammonia. It forms a series of beautiful dye-drugs with oxide of lead, mercury, and other metals, available in calico-printing as well as in dyeing. In dyeing cotton by this agency, lead and mercury are used as mordants in the acetates and chlorides. In calico-printing the *M.* is mixed with thickened nitrate of lead, and the printed cloth is afterwards passed through a particular solution of corrosive sublimate and acetate of soda. *M.* has only been applied in these arts during the last few years, but the consumption of it has become considerable, about 12 cwt. per week being made at one manufactory in Manchester, England, requiring 12 tons of guano to produce it. The substance resembles the exquisite aniline dye-drugs in this,— that both kinds are produced from unsightly and repulsive bodies, the one from guano, the other from coal-tar. *M.* is prepared for the dyers and calico-printers in two forms, as a powder and as a paste. *Imp.* free.

Muriate, or **Hydrochlorate**, a salt formed by muriatic or hydrochloric acid combined with a base. Several *M.* are of great value in the arts.

Imp. duty: *M.* of barytes, 20 per cent; *M.* of cinchona, 40 per cent; *M.* of gold, 20 per cent; *M.* of potassa, free; *M* of strontium, 20 per cent; *M.* of tin, 30 per cent.

Muriatic Acid, the old name for hydrochloric acid.

Murrain, a contagious disease among cattle, generally caused by a hot, dry season, which occasions an inflammation of the blood and a swelling in the throat, which soon becomes fatal.

Muscat, a city and seaport situated on the E. coast of Arabia, about 96 m. N. W. of Cape Rasselgate (Ras-el-mad), in lat. 23° 38′ N., lon. 58° 37½′ E. It is the chief port of the kingdom of Oman, a slip of land running half-way down the Persian Gulf on its W. side and the sea of Oman to Ras-el-mad, and thence along the S. E. coast of Arabia to Dofar. Pop. 40,000.

The harbor, which is the best on this part of the Arabian coast, opens to the N., and is shaped like a horseshoe. It is bounded on the W. and S. by the lofty, projecting shores of the mainland, and on the E. by Muscat Island, a ridge of rocks from 200 to 300 feet high. The town stands on a sandy beach at the S. end or bottom of the cove or harbor, about 1¼ m. from its mouth. The depth of water near the town varies from 3 to 4 and 5 fathoms. Ships at anchor are exposed to the N and N W. winds; but as the anchorage is everywhere good, accidents are of very rare occurrence. Muscat is a place of considerable importance, being at once the key to, and commanding the entrance of, the Persian Gulf. The government of the Sultan of Oman, or Imam of Muscat (whose proper title is *Seyid*), is more liberal and intelligent than any other in Arabia or Persia. The town, situated at the bottom of a high hill, is ill-built and filthy; and, during the months of July and August, is one of the hottest inhabited places in the world. The country in the immediate vicinity of the town is extremely barren; but it improves as it recedes from the shore. Dates and wheat, particularly the first, are the principal articles of produce. The dates of this part of Arabia are held in high estimation, and are largely exported, those of Bushire and Bussorah being imported in their stead A date-tree is valued at from 7 to 10 dollars, and its annual produce at from 1 to 1½ dollars. An estate is said to be worth 2,000, 3,000, or 4,000 date-trees, according to the number it possesses.

But the place derives its whole importance from the commerce and navigation of which it is the centre. The Imam has some large ships of war, and his subjects possess some of the finest trading vessels to be met with in the Indian seas. More than half the trade of the Persian Gulf is carried on in ships belonging to Muscat. But, exclusive of the ports on the Gulf, and the S. and W. coasts of Arabia, ships under the flag of the Imam trade to all the ports of British India, to Singapore, Java, the Mauritius, the east coast of Africa, etc. The pearl-trade of the Persian Gulf is now, also, wholly centred at Muscat. All merchandise passing up the Gulf on Arab bottoms pays a duty of ¼ per cent to the Imam.

Muscat, Muscatel, a rich, sweet wine made of muscatel grapes in the S. of France and in Spain. These grapes are also dried on the vine, for fine table-raisins.

Muscovado, the trade name for the ordinary dark-colored, raw, unrefined sugar of commerce; moist sugar.

Muscovy Glass. Mica plates are sometimes so called from having been used in Russia for lanterns and windows instead of glass.

Musette, the French name for the bagpipe.

Museum, a building appropriated to objects connected with science and art.

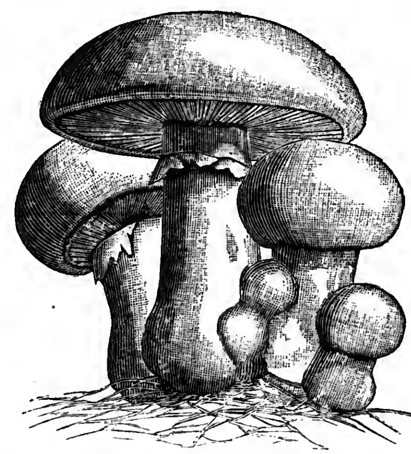

Fig. 362 — Common Mushroom.

Mushroom, a tribe of fungi (*Agaricus*), some species of which are used for pickling, catsup, powder, and for dressing fish, or to form a dish by themselves, either stewed, broiled, or baked. Their season in New York is September; and the most delicate are those found on old, close-cropped pastures, or open downs by the seashore. They may be kept in the dry state for years without losing their aroma. Many kinds are poisonous, and it is only by experience that the eatable varieties can be distinguished. That usually cultivated is the common *M.*, *A. campestris* (Fig. 362). The importance of the *M.* as an article of diet has never been properly understood in the U. States, nor is it generally known how abundant our supply of

edible *M.* is. The common *M.* is now to some extent successfully cultivated near New York, but the most of our supply comes from Europe in small tin cases. *Imp.* duty: dried *M.*, 10 per cent.

Mushroom-Spawn, the seed of the mushroom.

Musical Box, a small barrel-organ machine, which is often made to play a large number of popular tunes. On the same principle clocks are made to play tunes at the hours. The musical boxes of Prague in Austria and of the Suzanne in France are largely exported, but the best come from Geneva, and from the Croix in the Canton of Vaux, Switzerland.

Musical Instruments may be arranged into three classes, namely, wind instruments, stringed instruments, and those in which the sound is produced by concussion. Their manufacture and sale afford employment to a considerable number of persons in this country. American pianos and parlor organs excel all others; but the finest brass wind instruments, violins, clarionets, flutes, etc., are imported. All musical instruments are described in this work under their specific names.

Imp. duty: 30 per cent. Musical toys, 50 per cent

Musical Telephone. See TELEPHONE.

Music-Paper, lined paper, ruled in a particular manner for writing music on.

Music-Plate, an engraved plate with music notes, for taking impressions from.

Music Printing. Music was first printed by letter-press, the notes being cast in separate types, with ledger-lines attached to them. The form of the note was either square or lozenge-shaped before the adoption of the circular. It was about the year 1720 when music was first engraved on plates, — a change which was considered a great improvement, and which became generally adopted. Some years afterwards a mode was introduced of casting music in sand, not in separate types, but by a kind of stereotype; it was, however, soon laid aside. In 1764, Breitkopf invented a mode of casting each note in separate pieces, the ledger-lines not being in the same piece of metal as the note itself. Then arose Reinhard's plan of printing the ledger-lines from engraved plates, and the notes from types. A more modern system has the whole ledger-line in one piece, cut in brass or type metal, and extending the full width of the page; the notes are cast in such a way as to admit of the ledger-line crossing the notes when they are required to be on the line. Gradually it became a custom to engrave nearly all music on a kind of hard pewter or soft type-metal plate, and to print by the copperplate press. Recently the old style of type-printing has been revived in a vastly improved form, and with such marked result as to cheapness that a complete copy of the *Messiah*, for voices and piano-forte, can be procured for 25 cents.

Imp. duty: music printed on lines, bound or not, 20 per cent

Music-Smith, a workman who makes the metal parts for piano-fortes, etc.

Music-Stand, a light frame for holding a piece of music or book.

Music-Stool, a round-seated screw-pivot stool for piano-forte players.

Music-Type, the symbols or notes of music, cast for printing from.

Musigny. See BURGUNDY WINES.

Musk [Fr. *musc;* Ger. *Bisam;* It. *muschio;* Russian, *kabarga*], a fragrant substance secreted in a glandular pouch under the belly of the male of the musk-deer (*Moschus moschiferus*), which inhabits the elevated regions of Asia. Musk in its fresh state has the consistence of an electuary of a reddish-brown color; but by keeping it becomes dry and crumbly. The best comes from China in small round bags, covered with brownish hairs, and containing at the most 1½ drachms, large-grained, and of a deep-brown color, and a strong ammoniacal smell. The Siberian or Russian musk is greatly inferior. It is small-grained, light brown, of a weaker and more fetid smell, with little ammoniacal odor; the bags longer and larger. Musk, from its high price, is often adulterated, more especially when purchased in grains, and not in the natural bags of the animal. It is an article of the Materia Medica, and is extensively used as a perfume. It should be preserved in closely stopped glass bottles, in a place neither very dry nor too damp.

Imp. duty: crude, in natural pod, free; in any form used in perfumery, 50 per cent

Musket. Under GUNLOCK it is explained that the mode of firing off the gunpowder and bullet led to successive improvements in fire-arms, — the percussion-cap superseding the *matchlock, wheel lock, flintlock,* and *flint and steel* of earlier days. The *M.* has for many generations been the familiar name for the infantry soldier's weapon; and it is to this weapon that these improvements have chiefly been applied. The smooth-bore *M.* is now superseded by the *rifle*, a much more highly finished weapon, with the bore rifled, and a range five times as great. The *musketoon* of old days was a *M.* with a very short barrel, having a very wide bore. It may here be remarked that no improvement in the *M.*, no substitution of the rifle for it, has had much effect upon that remarkable branch of the trade of Birmingham which relates to *cheap* or African *M.* Nor is such effect likely to present itself in any marked degree. If the gun will shoot at all, it will suit the ideas of this class of buyers. Such guns are sent to the West Coast of Africa, where they are exchanged for native produce, chiefly palm-oil. Most ships trading to those parts take out some as part of the cargo. The taste of the African, we are told, is fickle in the matter of beads; a shade of color which is in demand one season may be rejected the next; but in the musket he rejects all improvements, rigidly adhering to the old flintlock, which has become part of the treasures of his tribe. Another remarkable feature is, that each tribe has its own favorite pattern; some choose longer barrels than others, while the stock for one district must be black, for another brown, for a third red, — a distinction easily effected, seeing that the stocks are merely stained beech-wood.

Imp. duty: *M.*, rifles, and other fire-arms, 35 per cent; *M.* barrels, part steel, 45 per cent; bayonets, 45 per cent; bullets and stocks, 35 per cent; rods (iron), 35 per cent, (steel) 45 per cent.

Musket-Barrel, the metal tube of a musket, which is sometimes browned or bronzed, and sometimes plain.

Musket-Lock, the hammer or striking part of a gun; the nipple, etc., of a percussion-lock.

Musketoon. See MUSKET.

Musk-Melon. See MELON.

Musk-Rat, MUSQUASH, a burrowing animal, the *Fiber zibethicus*, native of North America, sought for its skin, the fur resembling that of the beaver. See FUR.

Musk-Rose, a variety of rose, from which a very odoriferous oil is obtained in the regency of Tunis.

Musk-Seed, the seeds of *Abelmoschus moschatus*

(or *Hibiscus abelmoschus*), which are stimulating, cordial, and stomachic, and made into a tincture by the Arabs against serpent bites.

Musk-Wood, a pretty, veined, dotted wood, useful for the cabinet-maker, obtained from the *Euribia argophylla* in Tasmania.

Muslin [Fr. *mousseline;* Ger. *Musselin, Nesseltuch;* It. *mussolina;* Sp. *muselina*], a very thin cotton material, with a downy nap on the surface. Formerly all *M.* were imported from the East; but now they are manufactured in immense quantities at Manchester, Glasgow, etc., of a fineness and durability which rival those of India, at the same time that they are very considerably cheaper. The name is now given to a numberless variety of cotton fabrics manufactured in the U. States, France, and England; such as book, mull, jaconet, bishops' lawn, saccharilla, harness, leno, nainsook, seerhard, foundation, cambric, cord, and fancy checks, etc. Figured *M.* are wrought in the loom to imitate the tamboured *M.* The name is also applied to coarser and heavier cotton goods, as shirting and sheeting *M.*

Muslinets, a kind of muslin, made in England, of which there are several varieties, as single cord, and fancy satin stripes and figures.

Musquash. See Musk-Deer.

Musquito-Bar, a canopy of thin muslin surrounding a bed, to keep out the troublesome mosquitoes and other flying insects. The name is also sometimes given to wire-cloth frames applied to the windows and doors to exclude out-doors insects from a room.

Musroll, the noseband of a bridle.

Mussel, a common mollusc, the *Mytilus edulis*, esteemed as food in Europe. The shells are used to hold gold and silver paint or size for artists. In several species of river-mussel pearls are found.

Mussuck, a large skin or leather bag, used for supplying water in India.

Must, the juice of the grape before fermentation has commenced.

Mustaiba, a close, sound, heavy wood imported from Brazil, and used for turning, and for making the handles of glaziers' and other knives. The veins are of a chestnut brown, running into black.

Mustang, a wild horse.

Mustard [Fr. *moutarde;* Ger. *Mustert, Senf;* It. *mostarda;* Sp. *mostaza*], a plant (*Sinapis*) of which there are several species. It is a native of Europe, but is now naturalized, and a common weed in some parts of the U. States. It is, besides, very commonly cultivated for the sake of the seeds, which are of considerable importance in medicine, and which, when powdered and mixed with vinegar, form the well-known condiment also called *mustard*. Its greenish-yellow hue, acrid taste, and pungent, irritating odor, when mixed, are familiar to all. Two species of seeds are used, the black (*S. nigra*), and the white (*S. alba*): the first is more pungent, and of a much finer quality; but as the flour made from it retains a darkness of color, from which that of the white variety is free, and as, besides, less labor is required in the manufacture of the latter, it is now frequently employed, either alone or in mixture with the other; the seeds are crushed between rollers, then pounded in mortars, and the finer portions sifted from the husks. Flour of mustard is commonly adulterated with wheat flour to increase the weight, capsicum or cayenne to impart false pungency, and turmeric to give color; sometimes also gypsum or white clay is used with chrome yellow to increase the color. English and American mustards are usually mixed with water and a little salt, but French and German mustards are prepared with various flavoring articles and usually cooked, so as to diminish the pungency. Of the imported French mustards, the most esteemed is that which contains tarragon. German mustard is mixed with vinegar in which black pepper, cinnamon and other spices, and onions have been added; the vinegar is used boiling, hence the mustard is very mild; it improves by keeping. — The husks of mustard-seed yield by expression a bland fixed oil which is used for burning and other purposes; the cake left after expressing, being too pungent for cattle food, is used as a manure. Under the name of mustard-seed oil is also imported from India to Europe an oil expressed from the rape, most of which is used in dressing woollen goods.

Imp. duty: ground, in bulk, 10 cts. per lb ; enclosed in glass or tin, 14 cts. per lb. ; seed (black and white), free; oil (not salad), 25 cts. per gallon ; oil (salad), $1 per gallon

Muster, a sample; a review; a drawing together.

Muster-Book, a book for entering attendance in.

Mute, a contrivance for deadening the sound of musical wind or stringed instruments.

Mutton, the flesh of sheep.

Mutton-Ham, a leg of mutton salted.

Mutton-Suet, the fat from the vicinity of the kidneys of the sheep.

Mutty-Pal, a resinous exudation from *Alianthus malabaricus*.

Mutual Benefit Life-Insurance Co., located in Newark, N. J., organized in 1843. *Statement*, Jan. 1, 1880: Assets, $34,953,070.03; liabilities, $29,268,713.11; gross surplus, $5,684,357.03; new policies issued in 1879, 3,368, amounting to $7,917,-612; policies in force, 42,286, amounting to $117,-720,246; premiums, $3,793,704.07; dividends paid to policy-holders, $1,417,273.21.

Mutual Life-Insurance Co., located in New York City, organized in 1843. *Statement*, Jan. 1, 1880: Assets, $88,212,700.68; liabilities, $77,056,-695.64; gross surplus, $11,156,005.04; new policies issued in 1879, 12,210, amounting to $38,394,554; policies in force, 95,423, amounting to $298,760,867; premiums, $12,687,881.72; dividends paid to policy-holders, $3,427,479.

Muzzle, a gag or headstall put on dogs to prevent them biting, or on calves to prevent them sucking. — The mouth of a gun.

Myam, the sixteenth part of the buncal, a weight for gold and silver, used in the East Indies.

Myriagramme, a French weight of 22.0486 lbs.

Myrialitre, a French measure of capacity, 10,000 litres = 34.3901 imperial quarters.

Myriamètre, the French league of 10,000 mètres, 10936.330 yards = 6 miles, 1 furlong, 28½ poles.

Myriorama, an exhibitional picture made up of fragments of buildings, landscapes, etc., so as to admit of an infinity of combinations.

Myrobolan, a commercial name for the dried, wrinkled fruit of various species of *Terminalia.* The fruit, varying from the size of an olive to that of a gall-nut, consists of a white pentangular nut, covered by a substance about two lines in thickness. The latter, which is the only valuable part, is mucilaginous and highly astringent; and being separated from the nut is employed, with the best effect, both by dyers and tanners, especially by the latter. It produces with iron a strong, durable black dye and ink; and with alum, a very full, though dark, brownish-yellow.

Imp. duty: crude nut for dyeing or tanning, free.

Myrrh [Fr. *myrrhe;* Ger. *Myrrhen;* It. and Sp. *mirra*], a resinous substance, the produce of one or several species of trees of the genus *Balsamodendron*, growing in Arabia and Abyssinia. It is imported in chests, each containing from one to two cwt. Abyssinian myrrh comes to us through the East Indies, while that produced in Arabia is brought by the way of Turkey. It has a peculiar, rather fragrant odor, and a bitter, aromatic taste. It is in small, irregularly shaped pieces, which can hardly be called tears. Good myrrh is translucent, of a reddish-yellow color, brittle, breaking with a resinous fracture, and easily pulverized. Its sp. gr. is 1.36. When it is opaque, mixed with impurities, and either white, or of a dark color approaching nearly to black, with a disagreeable odor, it should be rejected. *Imp.* free.

Myrtle, a well-known shrub, the *Myrtus communis.* The fragrant and aromatic dried fruit and flower-buds were formerly used as a spice, and are said to be so still in Tuscany: a kind of wine is formed of them, and the flowers yield a distilled water called Eau d'Ange.

Myrtle-Wax, a green solid vegetable fat obtained in the Cape Colony and North America from the berries of several species of *Myrica.*

N

Nab, the cock of a gunlock.

Nabit, powdered sugar-candy.

Nacarat, a pale-red color with an orange cast. — A fine crape or linen fabric fugitively dyed of such color. The brightest red crapes of this kind are manufactured at Constantinople.

Nacre, the French name for mother-of-pearl.

Nacreous, consisting of, or resembling, mother-of-pearl.

Nacreous Shells, iridescent shells; those which have an exterior or interior layer of pearl, of which several kinds are used for manufacturing purposes, as some species of *Meleagrina*, *Turbo*, *Nautili*, etc.

Nagasaki. See JAPAN.

Nagkushur, the fragrant flowers of an East India plant, the *Messa ferrea*, used as a perfume.

Nail, a small, pointed piece of metal, generally with a head, to be driven into a board or other piece of timber, and serving to fasten it to other timber. *N.* are still made very extensively by hand, and although *N.*-making machines are coming more and more into use, there are still 20,000 hands employed in England in *N.*-making on the old plan. *N.* are either cut by machinery or hammered by hand; the former are preferable on account of their sharp corners and true taper, and the facility with which they may be driven without the danger of splitting the wood. They are usually packed in kegs of 100 lbs. each, on which the size is marked. The different sorts are named from the use to which they are applied, or from their shape, as *shingle*, *floor*, or *horseshoe N.*; *tacks*, which are very small *N.* with large heads; *brads*, which have head only on one side; *spikes*, which are very large *N.*; and *pointes de Paris*, or French *N.*, which are small, neat, round *N.*, made of wire. In commerce, *N.* made of metals other than iron are always designated by the name of the metal, as brass *N.*, copper *N.*, etc. The term penny, when used to mark the size of *N.*, is supposed to be a corruption of pound. Thus, a four-penny *N.* was such that 1,000 of them weighed 4 lbs., a ten-penny such that 1,000 weighed 10 lbs. The following table exhibits the names, length of the various sizes, and the number of *N.* to the pound: —

2*d*. fine	1 inch long	880 per pound.
3*d*. fine	1½ "	635 "
3*d*. common	1¼ "	400 "
4*d*	1½ "	280 "
5*d*	1¾ "	195 "
6*d*. common	2 "	155 "
6*d*. fencing	2 "	80 "
7*d*. common	2¼ "	120 "
7*d*. fencing	2¼ "	65 "
8*d*. common	2½ "	90 "
8*d*. fencing	2½ "	50 "
9*d*. common	2¾ "	70 "
9*d*. fencing	2¾ "	40 "
10*d*. common	3 "	55 "
10*d*. fencing	3 "	30 "
12*d*	3¼ "	45 "
16*d*	3½ "	28 "
20*d*	4 "	20 "
30*d*	4½ "	16 "

In England, the *nailers*, or hand-*N.* makers, live chiefly in the Dudley district; while 16,000 tons of cut *N.* are now made yearly in Birmingham. The manufacture of *N.* in the U. States is also a branch of industry of considerable importance, carried on in large factories, chiefly in the States of Massachusetts, Connecticut, New York, and in the Schuylkill region of Pennsylvania. Our exports of *N.* for the year 1879, chiefly to Canada, Cuba, and Chili, amounted to 9,476,471 lbs., valued at $264,192.

Manuf. The making of hand-made or *wrought N* usually retains the character of a domestic manufacture, and forms the employment of a class of blacksmiths, called nailers, who, in England, are frequently assisted by the female members of their families. The iron is received by the nailer in the shape of narrow square rods, varying in size according to the kind of *N.* to be forged from them. The ends of several of these rods are put into the fire at once. When properly heated, one is withdrawn and forged on a steel anvil to a fine tapering point. The pointed end is then cut off at the proper length. In making some kinds of *N.*, this operation completes the *N.*, as in horseshoe *N.*; but in most cases a subsequent process is necessary in order to form the head. In order to effect this, the red-hot *N.* is dropped, point downwards, into a hole in an instrument called a *bore*. The hole fits the upper or thicker part of the *N.*, so that when dropped into it, a few well-directed blows of the hammer upon the thick, projecting end of the spike, or *N.*, converts it into a head of the required shape. Some nailers acquire great dexterity in their craft. One man has been known to make 34,000 flooring *N.* in a fortnight, which would require on an average 1,030,656 strokes of the hammer. *Cast N.* have long been used for the same purposes as wrought *N.* Although they are much cheaper, they are so clumsy and brittle that they can only be used for a few coarse purposes, as in plasterer's work and the nailing up of fruit-trees. For certain kinds of wood-work, however, a very valuable kind of cast *N.*, made from a pure material, called malleable cast-iron, is now employed. They are, however, as soft as copper, and therefore not suitable for use in hard wood. On account of the comparatively high price of wrought *N.*, and the insufficiency of cast *N.* as a substitute for them, many ingenious machines have been invented for forming *N.* by cutting or stamping out of plates or rods of wrought-iron. The first *N.*-machine put in actual use in England was that of Thomas Clifford, of the city of Bristol, patented in 1790. He used two iron rollers, faced with steel, in which were sunk impressions, or forms of the *N.*, half of the form being in each roller, and arranged circumferentially, so that a bar of iron, being passed between the rollers, came through a string of *N.*, the head of one *N.* being slightly joined to the point of the next; these were then separated by shears or nippers. Sometimes several rows of indentations were made in the surface of the rollers, and, instead of bars, a slip of sheet-iron was passed through, and being forced into the dies, was formed into *N.* Still another method was to form *N.* by casting, but these were too brittle to be of much service. In the U. States, the first record of machinery in the manuf. of *N.* goes up to 1775, when Jeremiah Wilkinson, of Cumberland, R. I., cut tacks from sheet-iron, and afterwards *N.* and spikes, forming the heads in a vice; but the first patent for a *N.*-cutting machine was granted to Josiah G. Person, or Pearson, of New York, March 23, 1794. On Jan. 16, 1795, Jacob Perkins of Boston obtained a patent for a cutting-machine. The following year patents were issued to Peter Cliff and to Amos Whittemore of Massachusetts, and to Daniel French of Connecticut. The first patent for a cutting and heading machine (Nov. 11, 1796) was granted to Isaac Garretson of Pennsylvania; and on Dec 12, 1796, a patent for a similar machine to George Chandler of Maryland. Afterwards several patents were granted to Jesse Reed, Samuel Rogers, and Melville Otis of Massachusetts, to Mark and Richard Reeve of Philadelphia, to Roswell Noble of Baltimore, and others. The machine invented by Jesse Reed, with some later improvements, is still largely used. At the Paris Exhibition of 1867 there was a *N.*-cutting machine, by the Wickersham Nail Company, of the United States, which cuts *N.* out of plate-iron with wonderful rapidity. One blow produces shank, head, and point. To cut *N.* $2\frac{7}{8}$ inches long out of plate-iron $\frac{3}{32}$ inches thick, the machine makes nearly 120 revolutions of the driving-shaft per minute, and cuts eight *N.* at each revolution, making upwards of 1,000 *N.* per minute. Robinson's *N.*-making machine, patented in 1866, acts on the self-feeding principle, in such a way that one person can attend to two machines, whereas in those which are hand-fed each machine requires an attendant to feed it. In most of the machines hitherto invented the strip of metal employed has a width equal to the length of the *N.* which are to be cut from it; thus, 1½-inch *N.* would require 1½-inch strip. In Robinson's machine, however, a strip four times as wide as the length of the *N.* may be used, and four rows of *N* cut from it, thereby saving time in the cutting of the strips beforehand. Another improvement claimed is, that the *N.*, unlike those usually made, do not become hardened in the cutting, and require no annealing. The accompanying cut

and following reference are borrowed from the most valuable *Knight's American Mechanical Dictionary*: —

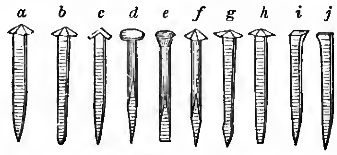

Fig. 363. — Nails.

a. Rose-nail; sharp point, a flat head showing facets, square shank.
b. Rose-nail; flat point, square shank.
c. Clasp-nail; bastard (medium) thickness, barbed head, square shank.
d. Clout-nail; fine point, flat, circular head, and round shank.
e. Counterclout nail; countersunk head, flat point, round shank.
f. Dog-nail; faceted head, round shank, fine point.
g. Kent-hurdle nail; a broad, thin, rose head, flat shank, spear-point for clinching.
h. Rose-clinch nail; rose head, square point, either clinched or riveted down on a washer or *rove*.
i. Horseshoe-nail; countersunk head, square shank, fine point.
j. Brad; billed head, square shank, fine point.
Imp. duty: board *N.*, spikes, rivets, and bolts, wrought, 2½ cts. per lb; horseshoe *N.*, 5 cts per lb.; cut *N.*, 35 per cent; ornamental iron *N.*, with brass, gilt, or polished heads, 35 per cent; silver, or German silver *N*, 40 per cent; brass and zinc *N.*, 35 per cent; copper, chief value, 45 per cent; *N.*-plates, 35 per cent.

Nail, a measure of length, 2¼ inches, or the 16th part of a yard.

Nail-Brush, a toilet-brush for scrubbing and cleaning the finger-nails.

Nailer, a workman employed in nail-making.

Nail-Extracter, a tool with nipping claws for grasping and withdrawing a nail.

Nail-File, a small file for smoothing the finger-nails.

Nailing-Machine, in shoemaking, an automatic machine for driving the nails into shoe-soles.

Nail-Scissors, small, short scissors, with files on the sides, for trimming the finger-nails.

Nainsook, Nansook, a thick sort of jaconet muslin, plain or striped or plaided, usually put up in pieces of 20 yards, and from 30 to 31 inches wide.

Namad, a course woollen cloth or blanket, made in Persia.

Name, the designation of a business house or firm, which may exhibit only one name, as H. Curtin & Co., though consisting of several partners of different names. It frequently happens that the name of a well-known commercial house is preserved long after the death of one, or even of all the original partners. In the State of New York, however, a law passed in 1833, and modified in 1849 and in 1854, provides that "no person shall hereafter transact business in the name of a partner not interested in his firm, and where the designation 'and Company,' or '& Co.' is used, it shall represent an actual partner or partners; but, concerning firms or copartnerships having business relations with foreign countries, the use of any copartnership name is allowed to be continued by some or any of the copartners, their assigns or appointees, provided that on every change of the persons continuing such use, a certificate shall be filed with the clerk of the county, and the same to be published in one or more newspapers in the county, declaring the person or persons dealing under such name, with their place or places of abode."

Names of Vessels. By sections 4178, 4179, and 4495 of the U. States Revised Statutes, "the name of every registered vessel, and of the port to which she shall belong, shall be painted on her stern, on a black ground, in white letters, of not less than 3 inches in length, under a penalty of $50; and steamers shall, in addition, and under same penalty, have her name conspicuously placed in distinct, plain letters, of not less than 6 inches in length, on each outer side of the pilot-lamp, if it has such, and in case the vessel has side-wheels, also on the outer side of each wheel-house. No master, etc, of any vessel of the U States shall in any way change the name of such vessel, or by any device, advertisement, or contrivance to deceive or attempt to deceive the public, or any officer or agent of the U. States, or of any State, as to the name and character of such vessel, on pain of forfeiture of such vessel"

Namur Oil, Nemaur Oil, a fragrant, deep yellow grass oil, obtained from the *Andropozon isvaranchusa*, in the East Indies.

Nankeen, Nankin, the commercial name for a strong, buff-colored cotton cloth, made in China, from a species of yellowish cotton grown in the Nankin district, and at one time much used in Europe and in this country for men's trousers and women's pelisses. English and American imitations, for which white cotton is used, and dyed to the proper tint of yellow by means of alum, oak bark, arnotto, and other substances, are inferior to the Chinese, particularly in the durability of color; but they are so much cheaper that they are now largely exported to India, and even to China, from whence part of it is, very likely, re-shipped in peculiar packages, with the mark Li upon it.

Nantes. See France (Seaports).

Nap, the woolly or villous substance on the surface of cloth; the silky integument of hats, etc.

Napa. See Loo-choo Islands.

Napery, table-linen in general.

Naphtha, a term which has been very loosely applied to an endless variety of pungent, volatile, inflammable liquids, but now exclusively applied in the U. States to a series of light hydrocarbons obtained from petroleum, and readily distinguished by the absence of oily bodies, so that they leave no permanent stain on common writing-paper, as do all the heavier oils derived from petroleum. The article most generally known in commerce as *N.* is a colorless liquid, of bituminous odor, tasteless, soluble in all proportions in absolute alcohol and in ether, and insoluble in water; sp. gr. 0.700 to 0.847. It is very inflammable and explosive, and as it is also very cheap, it has been largely used under various names to adulterate petroleum, so causing perhaps more loss of life and destruction of property than any other chemical product. Its sale is now permitted only for legitimate purposes. *N.*, dissolving the fixed and essential oils in all proportions, is used with advantage for removing grease-spots, and for the extraction of oils from seeds. *N.* is a good solvent for gutta-percha, india-rubber, sulphur, phosphorus, and the resins, a quality which adapts it for the preparation of varnishes, and other similar uses in the arts; it is also used instead of benzole (see Naphthalizing) for increasing the illuminating power of coal-gas, etc.

Naphthaline, a hydrocarbon obtained from the distillation of numerous organic bodies, chiefly for coal-tar, and which is gradually becoming very important in the arts. Pure *N.* has the form of brilliant white, scaly, rhombic plates of peculiar odor, taste weak at first and afterwards burning, crackling in the hands as sulphur; sp. gr. 1.151. It is destructive to moths, and is used as a substitute for camphor in the protection of woollens, plants, and objects of natural history. The French chemists have found a convenient mode of obtaining benzico acid from it, and this acid is the starting point of the manufacture of the beautiful aniline colors. A new acid, called *naphthalic*

or *phthalic acid* has been obtained from *N.*, which dyes wool an intense red without the aid of any mordant, and produces valuable coloring agents by combining with other substances, — such as a beautiful golden yellow pigment with lime, a fine orange with barium, a deep madder red with aluminium, intensely bright red with copper and mercury, rich red-brown with zinc and cadmium, a fine garnet color with nickel and cobalt, a nasturtium color with lead, and some very brilliant new tints in combination with aniline and rotaniline.

Naphthalizing is a process to some extent employed in increasing the brilliancy of street gas. It consists in mixing the gas with the vapor of naphtha in a vessel called the *carburetter* or *naphthalizer*. There may be as little as two, or as many as twenty, grains of carbon absorbed by every cubic foot of gas, according to the extent of surface of naphtha with which the gas is enabled to come in contact. Threads or wicks saturated with naphtha are found to increase this amount of action. The temperature of the apparatus, and the rapidity with which the gas passes through it, also influence the completeness of the carburetting process, and the increase of brilliancy in the light. It is only in poor gas that the naphthalizing process is deemed worth trying.

Napkin, a small damask cloth for table use, for a tray, or for tying up infants.

Napkin-Ring, a small ring of ivory, shell, wood, or some other substance, to enclose a dinner napkin.

Naples. See ITALY (SEAPORTS).

Naples Yellow, a pigment prepared by calcining antimony and lead with alum and salt. It was employed in oil-painting, and also for porcelain and enamel, but is now superseded by chromate of lead.

Napoléon, a name for the French gold coin of 20 francs. See LOUIS.

Napping Machine, a machine for raising the nap or pile on woollen and cotton fabrics.

Narcissus Oil, an essential oil obtained by distillation from some of the fragrant species of *Narcissus.*

Narcotic, a medicine which in medicinal doses acts as an opiate or anodyne, producing sleep, and allaying pain and morbid sensibility; but which in poisonous doses causes stupor, coma, convulsions, and when, administered to excess, death. Most *N.* have an effect of temporary stimulating power; and this is manifested principally when they are given in small doses, while a full dose generally produces the narcotic effect at once, without any apparent stimulation preceding it. To this class of medicines belong opium, hemlock, henbane, belladonna, aconite, stramonium, camphor, digitalis, tobacco, alcohol, ether, nux vomica, leopard's-bane, hop, strong-scented lettuce, and a variety of other substances.

Nard. See SPIKENARD.

Nargheel, a small hookah pipe.

Nargil, a name for the cocoa-nut tree in Southern India.

Nargile, a Turkish pipe, for smoking through water by means of a long marpidge or tube.

Narrow-cloths, in the woollen trade, those under 52 inches wide; cloth beyond that width being termed broad-cloth.

Narrow-Gauge, a railroad where the rails are placed less than 4 feet 8½ inches apart, which is the common distance between the wheels of locomotives and railroad-cars. Narrow-gauges now used vary from 3 feet 6 inches to 2 feet. It is claimed in advocacy of narrow-gauges that they necessitate less excavation and embankment, and permit the employment of lighter rails, the cars being made much lighter in proportion to the weight they are capable of transporting.

Narrowing, in knitting, contracting the fabric by throwing two stitches into one.

Narwhal, SEA-UNICORN, a marine animal, the *Monodon monoceros*, the long spiral horn or tusk of which furnishes ivory, although seldom used in manufacture.

Nashua and Rochester R.R. runs from Nashua to Rochester, N. H., 48.81 m. This Co., located at Nashua, was chartered in 1867, and the road was completed in 1874. In 1872 the line was rented for 50 years to the Worcester and Nashua R.R. Co., at a rental — as reduced in 1879 — of 3 per cent on cost and 5 per cent on the bonds. Capital stock, $1,305,800; funded debt, $700,000. Cost of road, $2,005,800.

Nashville. See TENNESSEE.

Nashville, Chattanooga, and St. Louis Railway runs from Chattanooga, Tenn., to Hickman, Ky., 321 m.; branches, 27.5 m.; lines purchased in 1877: Tennessee and Pacific R.R., 30 m.; McMinnville and Manchester R.R., 35 m.; and Winchester and Alabama R.R., 40 m. Total of lines owned and operated, 453.5 m. This Co., located at Nashville, is the consolidation, in 1872, of the Nashville and Chattanooga, and Nashville and Northwestern R.R. Cos. Capital stock, $6,575,295.65; funded debt, $7,522,000. Cost of roads and outfit, $14,097,295.63.

Nashville and Decatur R.R. runs from Nashville, Tenn., to Decatur, Ala., 122.30 m. This Co., located at Nashville, is the consolidation, in 1868, of the Tennessee and Alabama, Central Southern, and Tennessee and Alabama Central R.R. Cos. The road was leased in 1872 for 30 years to the Louisville and Nashville R.R. Co., which has agreed to pay 6 per cent on the capital stock, and has assumed all funded and floating debts not exceeding $2,450,000. Capital stock, $1,642,557.33; funded debt, $2,105,000.

Nassau Fire-Insurance Co., located in Brooklyn, N. Y., organized in 1852. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $147,011.69; premiums, $68,622.09. Premiums received since the organization of the Co., $1,625,808.48; losses paid, $473,944.41; cash dividends paid to stockholders, $929,500.

Natal, a British colony on the S. E. coast of Africa, about 800 m. from the Cape of Good Hope, between lat. 27° 15′ and 31° 5′ S.; lon. 29° and 31° 30′ E., the Drakensberg Mountains forming its W. boundary, separating it from the territory of the Cape Colony and the Orange River Free State. It comprises an area of 18,750 sq. m., with a seaboard of over 200 m. It forms a distinct and separate colony, free from the control of the Governor of the Cape. The population, in 1878, was 355,500, consisting of whites, 22,650; natives, 319,950; coolies, 12,900.

The scenery in *N.* is in parts picturesque in the extreme; it is well watered, no less than 23 distinct rivers running through into the Indian Ocean, but not one of them is navigable. It has only one harbor on its coast, *D'Urban* or *Port Natal*, which is completely land-locked, but a bar prevents vessels above a certain tonnage from entering. *Pietermaritzburg*, the capital, is situated about 50 m. inland from Port Natal. The coast region, extending about 15 m. inland, is highly fertile, and has a climate almost tropical, though perfectly healthy. Sugar, coffee, indigo, arrow-root, ginger, tobacco, rice, pepper,

and cotton thrive amazingly, and the pineapple ripens in the open air; the midland district is more adapted for cereals and other European crops; while the upper district is chiefly a grazing one, and sheep-farming is the principal occupation of the inhabitants; horses and cattle are also reared in large numbers. The chief mineral productions are coal and lime. Large forests of valuable timber abound in the kloofs of all the mountain ranges, and many tracts along the coast are also well wooded. The chief exports are wool, sugar, coffee, ivory, hides and skins, and ostrich feathers. During the year 1878, 209 vessels entered Port Natal. The value of imports was $8,597,810, of which the U. States contributed $313,705; the exports, consisting chiefly of wool, amounted in value to $3,470,645.

National and International Exhibitions. See Exhibition in the Appendix.

National Banks. On May 17, 1781, Robert Morris of Pennsylvania submitted to Congress a plan of a national bank, to be called *The Bank of North America*, the principal disposition of which was "that the bank-notes payable on demand shall by law be made receivable for duties and taxes in every State, and from the respective States by the treasury of the U. States." The bank was chartered by Congress on the 31st December, 1781, with a capital not to exceed ten millions of dollars, and without any limitation of duration. The charter was confirmed by the State of Pennsylvania, in April, 1782, and it commenced its operations upon a capital, paid in, of $400,000, and as the country was deficient in notes of circulation, and its credit stood high, it was enabled to extend its issues vastly beyond its capital. The extensive circulation of the notes of the bank, occasioned by the disbursements of the government, which was a heavy borrower, emboldened its directors to overstep the bounds of discretion. The channels of circulation soon became surcharged, and the public, beginning to doubt the ability of the bank to redeem its notes on presentation, they were returned so rapidly for payment, that it was compelled to call upon its debtors for payment also. This reduction of loans occasioned a general pressure for money, bankruptcies, usurious extortions, the disappearance of specie, and the impossibility of procuring money at the legal rates of interest. Petitions were shortly afterward presented to the Legislature for the repeal of the charter, which was granted on the 13th September, 1785; but the bank continued its business, claiming the right to do so under the charter granted by Congress. In March, 1787, the Legislature revived its charter, limiting its capital to $2,000,000, of which only $830,000 were paid in, and its duration to fourteen years. It was successively rechartered, and now exists under the actual national system, with a capital of $1,000,000, and a net surplus of $1,000,000. In February, 1791, the first *Bank of the U. States*, established in Philadelphia, was chartered with a capital of $10,000,000, for 20 years, and on the expiration of its charter, in 1811, it was wound up, which was done without causing any crisis; and within about 18 months the stockholders had received 88 per cent on their stock. The number of State banks in 1800 was 32, having authorized capitals of $23,550,000, but it was not all paid in. Of these, 18 were in New England, 5 in New York, 2 each in Pennsylvania, Maryland, District of Columbia, and South Carolina, and 1 in Delaware. There are no reliable statements of the amount of circulation or specie on record prior to 1808, but estimates have been published by the Secretary of the Treasury in 1855, which give the circulation at $10,500,000 in 1800, and gradually increasing to $18,000,000 in 1807, while the specie *in the country* was estimated at $17,500,000, running up to $20,000,000 during the same period; the amount in the banks, however, is not even conjectured. In 1808 the Bank of the U. States had $4,787,000 in circulation, against $15,300,000 in specie; and the Secretary adds, "the policy of the banks in New England was widely different. They pushed their issues to the very limits of their credit, some of them issuing notes for even fractional parts of the dollar. The result was, that there was, in 1808-9, a grand explosion among the banks in New England, by which most of them were shattered, and some of them totally destroyed." The first return of specie in the banks was in 1811, when the amount was $15,400,000 against a circulation of $28,000,000. This amount must have been mainly drawn from the U. States Bank, whose charter expired the same year; for from the time of the embargo in 1808 to 1811, when our produce could no longer be exported, all who had any engagements to meet in foreign countries — all to whom remittances abroad were advantageous, if not indispensable — transmitted specie as the commodity most easily concealed and transported. From this time the amount of specie diminished; the unsettled state of our commercial and political regulations with foreign powers during the three succeeding years presented a new accumulation; and soon after our declaration of war against Great Britain, in 1812, the banks throughout the Middle and Southern States, which had for some time been paying specie reluctantly and sparingly, suspended altogether their specie payments. In 1814 all the banks in the Union, with the exception of those in New England, suspended payment, and the confusion and depreciation of their notes assisted the plan of re-establishing another *United States Bank*, which was finally accomplished in 1816, with a capital of $35,000,000, and a charter of 20 years' duration. This capital, as in the former bank, was paid "one fourth in coin and three fourths in stock, which the bank might sell at the rate of $2,000,000 per year." Though its affairs were mismanaged, and it sustained some heavy losses in the first years after its establishment, it was afterward conducted with great skill, prudence, and success. It established branches in nearly every State, and bought and sold bills of exchange between all parts of the Union to an immense amount, because the low rates of its premiums and discounts gave to it almost a monopoly of this branch of business. While it rendered this and other important services to commerce, it was the general financial agent of the government through nearly the whole term of its existence, and transmitted the public revenue to whatever points it was wanted with equal promptitude and certainty, and without charge. Its charter expiring in 1836, it was then dissolved, after ineffectual attempts in both houses of Congress, during two terms, to counteract the opposition of President Jackson, and to renew its charter. In June, 1832, the renewal of its charter passed the Senate by a vote of 28 to 20, and in July following the House of Representatives confirmed the vote by 107 to 85, but the President vetoed the bill a week afterward. The same corporation afterward obtained a charter from the State of Pennsylvania, but in 1841 it finally suspended payment, and its shares were sold during that year at $17½, and subsequently at $9, the same year. After the fate of the United

States Bank was decided, in 1832, the number of local banks was greatly multiplied, and rose from 330 banks in 1830, with capitals amounting to $145,000,000, to 829 banks in 1838, with $317,000,000 capital. So great an increase, and the consequent distention of the circulation, contributed, with the excessive importations of the four preceding years, especially in 1836, to the general suspension which took place in May, 1837. In 1838 such of the banks as had been best managed and had the largest capitals resumed payment in specie. But in 1839 and 1840 a further crash took place; and the bank-notes afloat, which, as has been seen, amounted to $149,185,890 in 1837, sunk to $83,734,000 in 1842, and to $58,563,000 in 1843. It is supposed that in this latter crash nearly 180 banks were totally destroyed. And the loss occasioned by the depreciation which it caused in the value of stocks of all kinds and of all sorts of property was quite enormous. And yet, vast as that loss was, it was really trifling compared with the injury resulting to society from the upheaving it occasioned of the elements of social order, and the utter demoralization of men by the irresistible temptation to speculation which it afforded, ending in swindling to retain ill-gotten riches. The evils of the banking system were aggravated by the lowness of the notes which most banks issued. This brought them into the hands of retail traders, laborers, and others in the humbler walks of life, who always suffer severely by the failure of a bank. After 1838 and 1842 various measures were taken in nearly all the States, but principally in New York, to restrain the free action of the banks, and to prevent a repetition of the calamities referred to. In New York, for example, banks were divided into two great classes, — the incorporated and the free banks. The former, incorporated by a State law, had to conform to certain regulations, and to contribute a half per cent annually upon their capital to a security fund, which was devoted to the payment of the notes of defaulting banks. But this was a most objectionable plan; for, in the first place, it did not prevent bankruptcies, and, in the second place, it compelled the well-managed banks to contribute to a fund which went to pay the debts of those that were mismanaged. It consequently declined in favor, and soon became rarely acted upon. In the other or free banking system all individuals or associations who chose to deposit securities (minimum amount $100,000) for their payment were allowed to issue an equal amount of notes. And this was certainly by far the more efficient as well as the more popular of the two plans. It was, however, not free from objection; because, 1st, A longer or shorter, but always a considerable, period necessarily elapses after a bank stops before its notes can be retired; and 2d, The securities lodged for the notes were necessarily at all times of uncertain and fluctuating value, while, in periods of panic or general distrust, they became all but inconvertible. The Sub-Secretary of the Treasury animadverted as follows on this plan, in a letter dated Nov. 27, 1854: "The policy of many of the State governments has of late years consisted in encouraging the issue of small notes, by sanctioning the establishment of what are popularly called 'free banks,' with deposits of stocks and mortgages for the 'ultimate' security of their issues. This ultimate security is, it may be admitted, better than no security at all. The mischief is, that it is least available when most wanted. The very causes which prevent the banks from redeeming their issues promptly cause a fall in the value of the stocks and mortgages on 'the ultimate security' of which their notes have been issued. The 'ultimate' security may avail something to the broker who buys them at a discount, and can hold them for months or years; but the laboring man who has notes of these 'State security banks' in his possession finds, when they stop payment, that 'the ultimate security' for their redemption does not prevent his losing twenty-five cents, fifty cents, or even seventy-five cents in the dollar. In a circulating medium we want something more than 'ultimate security.' We want also 'immediate' security; we want security that is good to-day, and will be good to-morrow, and the next day, and forever thereafter. This security is found in gold and silver, and in these only." — In 1857 another crash took place, and *all* the banks in the Union, from the Gulf of Mexico to the frontiers of Canada, again stopped payments. There had been a rapid increase of discounts since 1851, and that increase was especially great in 1856, and went on augmenting down to August, 1857. On the 8th of that month the discounts and advances by the New York banks amounted to $122,077,252, the deposits in their possession being, at the same time, $94,436,417. This was the maximum of both. On the 24th of August the Ohio Life and Trust Company, which carried on an extensive banking business in New York, stopped payments, and by so doing gave a severe shock to credit and confidence, which the suspension of two or three more banks turned into a panic. Notes being in a certain degree secured, the run upon the banks was principally for deposits. And to meet it they so reduced their discounts and advances, that, on the 17th October, they amounted to only $97,245,826. This sudden and violent contraction necessarily occasioned the suspension of many of those mercantile houses that had depended on the banks for discounts. And it did this without stopping the drain for deposits, which had sunk, on the 17th October, to $52,894,623, being a decrease of $41,546,784 in about two months. The universal stoppage of the banks was a consequence of these proceedings. — The civil war had as one of its consequences the introduction of a general banking law in the U. States, conformable in many respects to the principles of what we have described as the free banking law of New York. This is the *National Bank Act* of June 3, 1864, which, as amended by the Acts of March 3, 1865, March 2, 1867, July 25, 1868, July 14, 1870, March 3, 1873, June 20, 1874, and Jan 14, 1875, now continues in force. This act provides for the establishment in the Treasury Department of a separate bureau, which shall be charged with the execution of all laws which may be passed by Congress respecting the issue and regulation of a national currency; the chief officer of said bureau to be denominated the Comptroller of the Currency, who is to act under the general direction of the Secretary of the Treasury, on whose recommendation he is to be appointed by the President and Senate. It further enacts that associations for carrying on the business of banking may be formed by any number of persons not less than five; and that each association, under their hands, shall make an Organization Certificate, which shall specify the name assumed by the association, the place where the banking business is to be transacted, the amount of capital stock, the number of shares into which it is divided, the names and places of residence of the shareholders, and the number of shares held by each of them, said certificate to be acknowledged and transmitted to

the Comptroller; that no association shall be organized with a less capital than $100,000, nor, in a city whose population exceeds 50,000 persons, with a less capital than $200,000; but banks with a capital of not less than $50,000 may, with the approval of the Secretary of the Treasury, be organized in any place, the population of which does not exceed 6,000 inhabitants; that the affairs of every association shall be managed by not less than five directors, all of whom must be citizens of the U. States, and each one of whom shall own in his own right at least ten shares of the capital stock; that the capital stock shall be divided into shares of $100 each; and that shareholders are held individually responsible, equally and ratably, and not one for another, for all contracts, debts, and engagements of such association to the extent of the amount of their stock, in addition to the amount invested in such shares; that every association, preliminary to the commencement of banking business, shall transfer U. States bonds to an amount not less than $30,000, and not less than one third of the capital stock paid in; that upon the proper examination being made into the affairs of the proposed institution, it shall be entitled to receive from the Comptroller of the Currency circulating notes equal in amount to 90 per cent of the current market value of the bonds transferred, but not exceeding 90 per cent of the par value of said bonds; that notes to an amount not exceeding $300,000,000 may be issued under this act; * that these notes shall be received at par in all parts of the U. States in payment of taxes, excises, public lands, and all other dues to the U. States, except for duties on imports, and also for all salaries and other debts and demands owing by the U. States to individuals, corporations, and associations within the U. States, except interest on the public debt, and in redemption of the national currency; that the rate of interest to be charged shall be that allowed by the laws of the State or Territory where the bank is located, or in the absence of any such rate, not exceeding 7 per cent; that each of the banks in St. Louis, Louisville, Chicago, Detroit, Milwaukee, New Orleans, Cincinnati, Cleveland, Pittsburgh, Baltimore, Philadelphia, Boston, New York, Albany, Leavenworth, San Francisco, and Washington City shall at all times have on hand in lawful money of the U. States an amount equal to at least 25 per cent of the amount of its notes in circulation and its deposits, and that all others shall keep a reserve of not less than 15 per cent; that every association shall pay to the Treasurer of the U. States in the months of January and July ½ per cent each half-year on the average amount of its notes in circulation, and a duty of ¼ per cent each half-year upon the average amount of its deposits, and a duty of ¼ per cent each half-year on the average amount of its capital stock beyond the amount invested in U. States bonds; that any State bank may become a national bank under this act. By an act amending the foregoing act, approved March 3, 1865, it was provided that notes shall be issued to associations according to capital as follows: To each not exceeding $500,000, 90 per cent; to each whose capital exceeds $500,000, but does not exceed $1,000,000, 80 per cent; to each whose capital exceeds $1,000,000, but does not exceed $3,000,000, 75 per cent; to each whose capital exceeds $3,000,000, 60 per cent; and that $150,000,000 of the entire amount of circulating notes authorized to be issued shall be appropriated to associations in the States, in the District of Columbia, and in the Territories, according to representative population, and the remainder shall be apportioned by the Secretary of the Treasury among associations formed in the several States, in the District of Columbia, and in the Territories, having due regard to the existing banking capital, resources, and business of such State, District, or Territory. By Act of June 20, 1874, it was provided that within six months from the date of the vote by the shareholders of an association to go into liquidation, the association shall deposit with the Treasurer of the U. States lawful money sufficient to redeem all its outstanding circulation, which money shall be placed to the credit of such association upon redemption account; that the bonds deposited by the association to secure payment of its notes shall be then re-assigned to it; and that thereafter the association and its shareholders shall stand discharged from all liabilities upon the circulating notes, and these notes shall be redeemed at the treasury of the U. States. By Act of Jan. 14, 1875, the limitation upon the circulation of national bank-notes was removed.

Before the passage of the act of June 20, 1874, no *N. B.* could reduce its circulation and take up its bonds except by returning a proportionate amount of its own circulating notes, and these were usually difficult to obtain; and prior to the act of Jan. 14, 1875, the total amount of circulation authorized to be issued was limited to $354,000,000. But these acts provided both for a reduction of circulation and withdrawal of bonds at the pleasure of the banks, upon a deposit by them of lawful money in sums of not less than $9,000, and for an issue of bank-notes to any association organized in conformity with law. Under the law, then, as it now stands, any number of persons not less than five, in any part of the country, who together may have $50,000 of capital at command, may organize a *N. B.* and receive circulating notes equal in amount to 90 per cent of such capital, — the law discriminating in the latter respect only against the large institutions, as no bank organized since the passage of the act of July 12, 1870, is entitled to circulation in excess of $500,000. A bank organized prior to that time, and having a capital of between $500,000 and $1,000,000, can receive in circulating notes but 80 per cent thereon; if between $1,000,000 and $3,000,000, it can receive but 75 per cent; and if over $3,000,000, but 60 per cent. Since the passage of the act of June 20, 1874, the *N. B.*, so far from considering the privilege of issuing circulation a profitable monopoly, have voluntarily surrendered $66,237,323 of their notes, which is $29,463,467 more than has been issued to all of the banks organized since that date, while 144 banks, with capital stock amounting to $15,517,000, and a circulation of $9,190,718, have gone into voluntary liquidation. — The *N. B.* have not at any time monopolized the business of banking, nor do they at the present time. On Jan. 1, 1879, there were in existence more than 3,700 State banks and private banking-houses, having an aggregate capital of $202,000,000 and deposits of $413,000,000. These banking establishments are located in all of the principal cities and villages of the country, and it is to be presumed that if the privilege of issuing circulating notes were so great as it is generally thought to be, these associations and individuals, who are already engaged in the business of banking, and who are free to enter the national system, would hasten to organize under that system. The amount of interest accruing annually upon the bonds held by the *N. B.* in 1879 — less the tax paid by them upon their circulation — was $14,544,692 only, while the annual profit upon the entire circulation of the *N. B.* was but $8,961,519, or less than two and one half per centum upon their capital. As the 3,700 banks and bankers mentioned still continue to transact their business as State banks or private associations, it seems very clear that this annual profit of $2,500 only, upon a capital of $100,000, does not present to them, or any of them, a sufficient inducement to transfer their business to the national system. The reason is obvious. The laws governing the *N. B.* contain numerous and burdensome restrictions, and impose many and severe penalties for their violation. On the one hand they authorize the issue of circulating notes, but on the other they require that the business of banking shall be conducted under a uniform system, which insures the greatest possible degree of safety to the depositor and bill-holder and prompt and certain convertibility to the circulating note. — One of the most important requirements of the *N. B.* act is that the capital stock of all institutions organized thereunder shall be fully paid in. The organization of banks without capital was one of the great abuses of previous banking systems. The history of banking in this country is full of instances of in-

* An additional amount of $54,000,000 was authorized by Act of July 12, 1870.

stitutions of this character, which were not only permitted to receive deposits and transact a general banking business, but were authorized to issue circulating notes; and to the frequent failures of these associations may be attributed, in a great degree, the prejudice still existing in this country against all banking corporations. When the national system was established especial care was exercised in the framing of the banking act, not alone to insure the safety and convertibility of the circulating-notes, but also to guard against the organization of banks without *bona fide* capital. At least fifty per cent of the capital stock of a national bank must be paid in before it can be authorized to commence business, and the remainder must be thereafter paid in instalments of not less than one fifth monthly, the payment of each instalment being certified to this office, under oath, by the president or cashier of the association. It is frequently stated, and it seems to be believed by many, that banks of circulation, only, may be organized under the act, — that is, that a bank may use its circulating notes either to increase its existing capital or to assist in organizing other banks without real capital. The law carefully guards against such an abuse. In the first place, as has been already stated, the officers and directors are required at the outset to certify under oath to the Comptroller of the Currency the amount of stock which has been paid into the bank as permanent capital, while subsequent instalments must be similarly certified. In addition to this, section 5203 of the Revised Statutes provides that "no association shall, either directly or indirectly, pledge or hypothecate any of its notes of circulation for the purpose of procuring money to be paid in on its capital stock, or to be used in its banking operations or otherwise; nor shall any association use its circulating notes, or any part thereof, in any manner or form to create or increase its capital stock." The Comptroller of the Currency is also authorized to examine every banking association before granting it authority to commence business, in order to ascertain whether or not its capital has been actually paid in. It is impossible, therefore, for a bank of circulation only, without capital, to be organized under the national system, if proper precaution be exercised and the examiner is competent and faithful in the performance of his duty.

Neither can an association increase its circulation at pleasure, for the circulation can never exceed a certain proportion of the paid-up capital. There never has been an instance of the organization of one national bank by the use of the circulation issued to another. Such an illegitimate transaction could scarcely fail to be at once detected and the facts reported to the U. States district attorney for his action thereon. If any association fails to pay up its capital stock, as required by law, or if its capital shall become impaired, an assessment must be made upon the shareholders, *pro rata*, for the amount of the deficiency or impairment, the interest upon the bonds held as security for its circulation being in the mean time withheld by the Treasurer, while a receiver may be appointed by the Comptroller if the capital be not restored after three months' notice by him to the association. — The proportion of capital, and of capital and surplus, to liabilities is much greater in this country than elsewhere, which is undoubtedly owing to the fact that our law requires that the full amount of authorized capital shall be actually paid in. In England, as a rule, only a portion of the capital is paid in, but the stockholders are individually liable for the full amount of their subscriptions. This restricted liability is true of the limited banks only, the stockholders of other corporations not limited being each liable for all of the debts of the corporation. — The following table, compiled from statements in the London Economist of October 19, 1878, exhibits the amount of capital, reserve and liabilities, and the ratio of capital, and of capital and reserve, to liabilities, of 3,417 banks (141 banks and 3,276 branches) of the United Kingdom: —

Banks.	Number of			Capital.	Reserve fund and undivided profits.	Total.	Liabilities.	Ratio to liabilities of —	
	Banks.	Branches.	Total.					Capital	Capital and profits.
				£	£	£	£	Per ct.	Per ct.
England and Wales......	72	1,144	1,216	26,046,420	13,761,814	39,808,234	223,679,548	11.64	17 80
Bank of England........	1	10	11	14,553,000	3,768,531	18,321,531	51,611,899	28.20	35.50
Isle of Man............	2	7	9	60.904	29,895	90,799	539.268	11 29	16.82
Scotland................	10	809	819	9,045,780	4,857,882	13,903,662	82,093,497	11.02	16.94
Ireland	9	270	279	2,950,000	1,374,141	4,324,141	20,800,649	14.18	20.79
Colonial with London offices	27	969	996	20,430,136	7,336,415	27,766,551	121,905,216	16.76	22.78
Foreign with London offices	20	67	87	17,563,130	2,840,444	20,403,574	39,623,424	44.33	51.49
Totals.	141	3,276	3,417	90,649,370	33,969,122	124 618,492	540,253,501	16.78	23.07
National Banks.									
October 1, 1878..................			2,053	$466,147,436	$157,833,993	$623,981,429	$1,140,179,314	40.88	54.73

A comparison of this table with a similar statement regarding the *N. B.*, which is also given above, shows the ratio of capital to liabilities of the 3,417 banks in the United Kingdom to be 16.78 per cent, and the ratio of their capital and reserve to liabilities to be 23.07 per cent; while the corresponding ratios of the national banks are 40.88, and 54.73; the ratios of the *N. B.* being in each instance more than double those of the United Kingdom. In the national banking system the existing ratio of capital to liabilities is nearly four times greater than is that of the 1,216 banks in England and Wales; while the ratio of the combined capital and reserve of the former banks to their liabilities is more than three times greater than that of the latter. — Previous to the passage of the national bank act, the circulating notes of banks located elsewhere than in New York or New England were not redeemable except at the counters of the issuing banks. As only about one third of the circulation of the country consisted of New York and New England notes, it may be said that the remaining two thirds had practically no general system of redemption. The legislation of the New England States provided only for redemption at the counter, although what was known as the Suffolk system compelled redemption in the city of Boston also. The New York law required redemption at the counter at par, and also in New York, Albany or Troy, at one fourth of 1 per cent discount. The New England currency, therefore, consisted of unsecured notes redeemable at par at the place of issue and in the city of Boston, while the New York currency was a secured note redeemable at par at its counter, and at a discount at its agency. The notes of the *N. B.* constitute the only secured circulation ever required by law to be redeemed at par at a central agency, as well as at their place of issue. If the New York system of redemption were to be applied to the *N. B.* circulation, in place of the existing method, it would probably at once raise the price of exchange to the rate current under that system, which was generally one half of one per cent. The Suffolk system was excellent, as a voluntary arrangement entered into by 500 banks, having an aggregate circulation of fifty millions only, and all located within the comparatively moderate area of the six New England States; but it would not be a practicable one if extended to more than 2,000 banks, distributed, as are the *N. B.*, throughout all the States of the Union, and having a circulation more than six times as great as that of the New England banks. So large a volume of circulating notes, issued at points so remote from each other, could not be made uniformly convertible by the legislative action of separate States, nor by the agency of individual corporations. Congressional action alone is adequate to accomplish this; and accordingly full provision was made by Congress for the convertibility of the *N. B.* circulation, by providing for its redemption at par, both at its place of issue and at the Treasury of the U. States. For the latter purpose the banks are, by a late act, required to keep on deposit with the Treasurer an amount of lawful money equal to five per cent of their circulation. — The law provides that no association shall, during the time it continues its banking operations, withdraw or permit to be withdrawn, in dividends or otherwise, any portion of its capital, and that no dividend shall ever be made to an amount greater than the net profits then on hand, deducting therefrom losses and bad debts. With these restrictions the banks are permitted to declare dividends semi-annually from their net profits, but are also required, before making any such dividend, to carry to surplus fund one tenth part of their net profits of the preceding half-year, until this fund shall equal twenty per cent of their capital stock.

The law thus designates three uses for the profits of the *N. B.*: First, for building up a surplus fund; secondly, to protect the capital stock from impairment by losses in business by the use of such fund when the other profits are insufficient, and, thirdly, for the declaration of dividends out of any remaining profits. As a rule, the banks in the national system have not made excessive dividends. In determining the true ratio of their profits, their accumulated surplus, as well as what is technically known as capital, must be considered, as it is from the use of both capital and surplus that their profits are derived. Even during the most prosperous years of the system, the ratio of annual earnings to the combined capital and surplus of the banks was not greatly in excess of the usual legal rates of interest in the States where they were located, while during the last years this ratio has been less than six per cent on the combined capital and surplus. The surplus of the *N. B.* amounted on Oct. 1. 1878, to nearly $117,000,000. A part of this sum represents the profits earned by former State banks previous to their conversion into national organizations, and brought by them into the system. The greater portion was, however, accumulated by the banks during the years of business prosperity immediately succeeding the close of the war. If the bank act gives to the *N. B.* the privilege of circulation, it also provides for a U. States tax upon circulation, deposits, and capital, and for a State tax upon the shares of each bank, to be determined by the legislature of each State, at a rate estimated to be not greater than is assessed upon other money capital in the hands of individual citizens of each State. The total amount of U. States taxes collected from the commencement of the system to the end of the fiscal year 1878 is as follows: On circulation, $39,775,817.35, on deposits, $40,-328,256.32; on capital, $5,929,480.73; total, $86,033,554 40.— The failures in this country of State banks and private bankers are known to have been numerous and frequent; but information as to their numbers or to the consequent losses to their stockholders or creditors, has not been attainable. The bank departments of the different States give no information on this subject except as to the losses upon bank currency, and even that information has been of a scanty character. As a rule, under the different State laws, the affairs of insolvent institutions have been liquidated by a receiver appointed by the court, and the receiver has not reported to any State officer, but to the court which appointed him Full information with reference to these insolvent institutions is therefore in most cases unattainable. The losses upon currency are estimated to have been five per cent annually upon the amount issued, but no estimate has ever been made of the losses to creditors and shareholders. Under the *N. B.* system, however, the losses as well as profits of each bank are reported to the office of the Comptroller of the Currency. If a bank becomes insolvent, the Comptroller, by law, appoints the receiver, and exercises full supervision over the closing up of its affairs. The files of his office, therefore, contain a complete record of everything pertaining to the settlement of the business of such associations. The following table exhibits the number of failures of *N. B.* in each State, together with their capital, amount of claims proved, the amount of dividends paid, and the estimated losses to creditors, from the organization of the system to July 1, 1878:—

State.	No. of banks.	Capital.	Claims proved.	Dividends paid.	Estimated losses.	Percentage of claims paid.
Connecticut	1	$60,000	$97,541	$82,910	$10,000	85.
New York	16	4,076,100	5,722,248	5,060,536	320,498	88.43
Pennsylvania	8	1,312,000	1,558,564	898,103	416,850	57 62
District of Columbia	2	700,000	2,288,828	1,785,173	503,655	78.
Virginia	4	800,000	1,679,045	646,818	931,789	38.52
Alabama	1	100,000	289,407	121,551	167,856	42
Mississippi	1	50,000	33,562	11,746	20,900	35.
Louisiana	3	1,100,000	2,981,554	1,805,060	922,900	61.02
Texas	1	50,000	60,330	....	60,000	....
Arkansas	1	50,000	15,142	15,142	....	100.
Tennessee	1	100,000	376,932	65,335	311,597	17 33
Missouri	3	3,100,000	2,683,093	951,918	740,000	35.48
Ohio	3	250,000	422,891	190,557	189,800	45.06
Indiana	4	282,000	505,531	239,893	178,800	47.45
Illinois	8	2,250,000	3,366,767	1,414,368	1,096,198	42.01
Wisconsin	1	50,000	134,445	47,055	70,000	35 00
Iowa	3	200,000	290,477	181,128	90,998	62.35
Minnesota	2	200,000	313,429	210,016	61,000	67
Kansas	2	160,000	141,576	84,195	57,381	59 47
Nevada	1	250,000	170,012	153,011	17,001	90.
Colorado	2	225,000	178,135	32,418	177,000	18.19
Utah	1	150,000	89,200	13,380	71,200	15.
Totals	69	$16,015,100	$23,398,709	$14,010,313	$6,415,423	59 88

From the above table it will be seen that the total amount of capital of all the insolvent *N. B* is $16,015,100; amount of claims proved, $23,398,709; of dividends paid, $14,010,313; while the estimated losses are but $6,415,423. The average number of failures during each of the fifteen years included in that table has been less than five, and the average annual loss less than $430,000.—The City of Glasgow Bank, which recently failed in Scotland, had a capital and surplus of less than $8,-000,000, and liabilities of more than $50,000,000. It loaned to four debtors of the bank more than $28,000,000, upon which there is a loss of more than $21,000,000. The deficiency in the assets is nearly $26,000,000, which is four times as great as the losses to all the creditors of *N. B.* which have failed since the organization of the system. The bank superintendent of the State of New York reported in 1878 the liabilities of 22 savings-banks which had failed in that State during the last six and one half years at $12,188,777, and estimated the losses to their creditors at $4,303,616, which is more than one third of their entire indebtedness. He estimated the losses during the three years 1875–77 at $3,400,000, which is more than one half of the estimated losses to the creditors of all the *N. B.* in the U. States from the beginning of the system to July 1, 1878. The losses from five State banks in the city of Chicago during the last two years, which banks were organized under special charters, under which neither State supervision nor reports were required, is estimated to be $3,819,500, on liabilities of $5,785,572. The losses from the State and savings banks of the country during the two years 1876 and 1877 only are known to have been greater than the total loss resulting from all the failures which have occurred of national banking associations. The government has had large amounts on deposit continually with a great number of *N. B.* throughout the country, for its convenience in making disbursements, but has suffered no loss during the twelve years from 1866 to 1878. Upon the circulating notes of the *N. B.* there has been no loss whatever.—*Report of the Comptroller of the Currency for the year* 1878.

The following table exhibits by States and geographical divisions the number of national banks organized and in operation, with their capital, bonds on deposit, and circulation issued, redeemed and outstanding, on Jan. 1, 1879:—

States and Territories.	Banks.			Capital.	Bonds.	Circulation.		
	Organized	In liquidation.	In operation.	Capital paid in.	Bonds on deposit.	Issued.	Redeemed.	Outstanding.
				$	$	$	$	$
Maine	74	2	72	10,660,000	9,626,250	20,538,580	11,738,656	8,799,924
New Hampshire	47	1	46	5,740,000	5,769,000	12,118,075	6,923,328	5,194,747
Vermont	50	3	47	8,533,000	7,662,500	18,979,600	11,627,166	7,352,434
Massachusetts	242	5	237	95,407,000	72,221,950	166,473,645	102,777,080	63,696,565
Rhode Island	62	1	61	20,009,800	14,254,400	35,026,715	21,976,505	13,050,210
Connecticut	86	4	82	25,504,620	20,323,700	47,555,410	29,564,017	17,991,393
Total Eastern States	561	16	545	165,854,420	129,857,800	300,692,025	184,606,752	116,085,273
New York	340	60	280	90,689,691	55,766,300	169,862,715	118,990,888	50,871,827
New Jersey	71	2	69	13,858,350	12,626,350	29,531,520	18,172,195	11,359,325
Pennsylvania	257	22	235	55,909,840	46,677,650	109,208,135	66,960,830	42,247,305
Delaware	14	..	14	1,763,985	1,549,200	3,432,665	2,000,605	1,432,060
Maryland	34	2	32	12,865,010	7,821,000	22,314,450	14,614,276	7,700,174
Total Middle States	716	86	630	175,086,876	124,440,500	334,349,485	220,738,794	113,610,691
District of Columbia	11	4	7	1,507,000	1,155,000	3,549,600	2,459,001	1,090,599
Virginia	29	11	18	3,285,000	2,529,850	7,226,270	4,865,578	2,360,692
West Virginia	20	5	15	1,756,000	1,458,000	4,941,430	3,393,022	1,548,408
North Carolina	15	..	15	2,551,000	1,764,000	3,986,200	2,272,720	1,713,480
South Carolina	12	..	12	2,851,100	1,490,000	3,580,325	2,230,960	1,349,365
Georgia	17	5	12	2,041,000	1,925,000	4,817,790	2,891,381	1,926,409
Florida	2	1	1	50,000	50,000	59,500	15,700	43,800
Alabama	11	1	10	1,658,000	1,621,000	2,990,130	1,511,142	1,478,988
Mississippi	2	2	..	....	....	66,000	65,389	611
Louisiana	11	4	7	3,475,000	1,820,000	6,557,760	4,533,224	2,024,536
Texas	12	1	11	1,100,000	680,000	1,686,420	1,149,415	537,005
Arkansas	3	1	2	205,000	205,000	531,900	280,307	251,593
Kentucky	55	7	48	9,936,500	8,546,350	18,039,495	9,812,155	8,227,340
Tennessee	32	7	25	3,080,300	2,754,500	6,400,280	3,832,947	2,567,333
Missouri	43	21	22	7,175,000	2,000,000	10,947,375	8,602,943	2,344,432
Total Southern States	275	70	205	40,670,900	27,998,700	75,380,475	47,915,884	27,464,591
Ohio	196	34	162	26,986,900	23,157,250	56,231,270	34,845,147	21,386,123
Indiana	115	21	94	15,026,530	12,918,500	34,542,755	22,144,156	12,398,599
Illinois	165	26	139	17,194,600	9,988,500	33,574,905	23,659,677	9,915,228
Michigan	90	11	79	9,514,500	6,275,750	16,253,190	10,255,860	5,997,330
Wisconsin	56	18	38	3.315,000	2,094,500	7,165,660	4,878,370	2,287,290
Iowa	99	23	76	5 927,000	4,557,000	12,427,740	8,038,221	4,389,519
Minnesota	39	8	31	4,968,700	2,679,400	7,124,660	4,502,396	2,622,264
Kansas	27	16	11	800,000	740,000	2,813,680	1,891,161	922,519
Nebraska	12	2	10	1,000,000	844,000	1,853,340	1,112,106	741,234
Total Western States	799	159	640	84,733,230	63,254,900	171,987,200	111,327,094	60,660,106
Nevada	1	1	..	....	....	131,700	128,587	3,113
Oregon	1	..	1	250.000	250,000	487,000	263,100	223,900
Colorado	18	5	13	1,235,000	823,000	1,611,920	868,639	743,281
Utah	4	3	1	200,000	50,000	614,930	545,874	69,056
Idaho	1	..	1	100,000	100,000	197,740	115,739	82,001
Montana	6	3	3	350,000	280,000	544,420	297,871	246,549
Wyoming	2	..	2	125,000	60,000	116,360	62.360	54,000
New Mexico	2	..	2	300,000	300,000	591,070	325,510	265,560
Dakota	3	..	3	175,000	110,000	155,530	56,530	99,000
Washington	1	..	1	150,000	50,000	45,000	....	45,000
Total Pacific States and Territories.	39	12	27	2,885,000	2,023,000	4,495,670	2,664,210	1,831,460
Due for mutilated notes retired	....	..	..	....	.. ..	....	....	1,339,674
Grand Total	2,390	343	2,046	469,230,426	347,574 900	886,904,855	567,252 734	320,991,795
Add gold banks	10	1	9	4,300,000	1,834,000	3,051,220	1,582,300	1,468,920
Total for all banks	2,400	344	2,056	473,530,426	349,408,900	889,956,075	568,835,034	322.460,715

National Debt. The national debt of the U. States originated in consequence of the expenses incurred during the revolutionary war, and amounted in the year 1791 to about $75,000,000. The revenue of the government enabled it to curtail the debt until the year 1812, when it was only $45,000,000. The war with England in 1812–15 added largely to this debt, the loans necessary for war expenditures being raised at a considerable loss. At the end of the war the debt was over $103,000,000. This was rapidly curtailed, and by the year 1835 was fully liquidated, besides an appropriation of several millions of surplus revenue to the individual States. The Mexican war, and the successive acquisitions of territory, rendered further loans necessary; but the national debt of the U. States, as it now exists, consists almost entirely of obligations incurred in consequence of the civil war. Its progress from 1791 to 1879 was as follows: —

Years.	Amount.	Years.	Amount.
1791	$75,463,476 52	1802	$80 712,632 25
1792	77,227,924 66	1803	77,054,686 30
1793	80,352,634 04	1804	86,427.120 88
1794	78,427,404 77	1805	82,312,150 50
1795	80,747,587 39	1806	75,723.270 66
1796	83,762,172 07	1807	69,218,398 64
1797	82,064,479 33	1808	65.196,317 97
1798	79,228,529 12	1809	57,023.192 09
1799	74,408,669 77	1810	53,173,217 52
1800	82,976.294 35	1811	48,005,587 76
1801	83,038,050 80	1812	45,209,737 90

Years.	Amount.	Years.	Amount.
1813......	$ 55,962,827 57	1847......	$38,826,534 77
1814......	81,487,846 24	1848......	47,044,862 23
1815......	99,833,660 15	1849......	63,061,858 69
1816......	127,334,933 74	1850......	63,452,773 55
1817......	123,491,965 16	1851......	68,304,796 02
1818......	103,466,633 83	1852......	66,199,341 71
1819......	95,529,648 28	1853......	59,803,117 70
1820......	91,015,566 15	1854......	42,242,222 42
1821......	89,987,427 66	1855......	35,586,956 56
1822......	93,546,676 98	1856......	31,972,537 90
1823......	90,875,877 28	1857......	28,699,831 85
1824......	90,269,777 77	1858......	44,911,881 03
1825......	83,788,432 71	1859......	58,496,837 88
1826......	81,054,059 99	1860......	64,842,287 88
1827......	73,987,357 20	1861......	90,580,873 72
1828......	67,475,043 87	1862......	524,176.412 13
1829......	58,421,413 67	1863......	1,119,772,138 63
1830......	48,565,406 50	1864......	1,815,784,370 57
1831......	39,123,191 68	1865......	2,680,647,869 74
1832......	24,322,235 18	1866	2,773,236,173 69
1833	7.001,698 83	1867......	2,678,126,103 87
1834......	4,760,082 08	1868.....	2,611,687,851 19
1835.....	37,733 05	1869......	2,588,452,213 94
1836......	37,513 05	1870......	2,480,672,427 81
1837......	336,957 83	1871......	2,353,211,332 32
1838......	3,308.124 07	1872......	2,253,251,328 78
1839......	10,434,221 14	1873......	*2,234,482,993 20
1840......	3,573,343 82	1874......	*2,251,690,468 43
1841......	5,250,875 54	1875......	*2,232,284,531 95
1842......	13,594,480 73	1876......	*2,180,395,067 15
1843......	20,601,226 28	1877......	*2,205,301,392 10
1843......	32,742,922 00	1878	*2,256,205,892 53
1844......	23,461,652 50	1879 (July 1)......	*2,349,567,482 04
1845......	15,925,303 01		
1846......	15,550,202 97		

The total amount of loans and treasury notes issued by the government previous to the civil war was $492,371,087, all of which has been paid, with the exception of $1,408,050, which has matured, but has not been presented for payment. The whole amount of loans and treasury notes issued since 1861 is $5,011,818,908. The enumeration of the loans which have contributed to the formation of our present enormous debt is given below; but the explanation of the vast transactions connected with these loans, whose magnitude is almost without a parallel in history, does not belong to the scope of this work. It must be looked for in the *Annual Reports of the Secretary of the Treasury on the State of the Finances*, 1861 to this day, in which the principle and policy of the government are clearly elucidated, and the history of the several issues, withdrawals, and cancellations is fully given.

The refunding of the national debt was authorized by the acts of Congress of July 14, 1870, and Jan. 20, 1871. This gigantic operation has been most wisely designed and conducted to signal success by Mr. Sherman, the illustrious Secretary of the Treasury, and forms to this day the most brilliant chapter of our financial history. Prior to May, 1877, the U. States bonds were mainly sold through an association of bankers; but experience has since shown that the plan of selling bonds to all subscribers on terms fixed by public advertisements secures a more satisfactory distribution for them, though their sales may be less. This plan has for excellent effect to popularize the public loans and bring them within the reach of every citizen who desires to invest his savings, whether small or great, in these securities. The most important refunding transactions took place in 1879; they are thus described by the Secretary of the Treasury: "On the 23d of November, 1878, there had been issued of four per cent consols for refunding purposes $144,770,900, and there remained at that time bonds redeemable for $566,251,100. On Jan. 1, 1879, the four per cent loan was offered to the public; and, in view of the practical effect of resumption, the Secretary offered to receive U. States notes in payment for the bonds sold. The bonds were rapidly sold in this country, and the resulting redemptions of five-twenties, many of which were held in Europe, rendered desirable the sale of the bonds in London sufficient to prevent the shipment of gold from this country. To attain this object a contract was made on the 21st day of Jan., 1879, with certain banks and bankers, under which they agreed to subscribe at once for $10,000,000 of four per cent bonds, with option of taking $15,000,000 more by monthly subscriptions of $5,000,000 during April, May, and June. On the part of the Government the bonds were to be delivered free of charge in London, at which place an agency was to be maintained during the continuance of the contract Under this contract $15,000,000 of bonds were taken. In the mean time, under authority of the act of Jan. 25, 1879, the Secretary offered to exchange four per cent bonds for uncalled five-twenties. The amount of five-twenties so exchanged was $806,000. On March 4, notice was given that when the remaining five-twenties should be covered by subscriptions, the sale of four per cents for refunding the ten-forty bonds would probably be made upon less favorable terms to the purchaser. Owing partly to fears that the heavy payments falling due in April and May would create a disturbance in the money market, there was a falling off in the sales of bonds during the month of March. Measures were successfully taken by the Department to secure the adjustment of the accounts of purchasers of the bonds without embarrassment to the business interests of the country. On the morning of April 4, the amount of outstanding five-twenties not covered by subscriptions to the four per cents was $59,565,700. Before the close of business on that day subscriptions were received sufficient to refund the remaining five-twenties, and in accordance with previous notice the offer of January 1 was rescinded. Additional subscriptions were received and rejected, amounting to $60,919,800 The refunding of the five-twenties having been accomplished — and no other six per cent bonds being redeemable — on April 16, $150,000,000 of the four per cent bonds were offered at a premium of one half of one per cent, the proceeds to be applied to the redemption of the five per cent bonds issued under the act of March 3, 1864, known as ten-forties, reserving the residue, $44,566,300, necessary for the redemption of the entire loan, for the conversion of refunding certificates offered at the same time. The four per cent bonds were also offered in exchange for any outstanding uncalled ten-forty bonds. On the following day subscriptions amounting to $149,389,650 were received and accepted, and $34,755,000 received and declined, and the offers of the four per cent bonds were withdrawn. One subscription for $40,000,000 of the certificates was also received and declined, the evident purpose of the law authorizing the issue of these certificates being to cause, as far as practicable, a distribution of the public debt among the people. Exchanges were also made in the amount of $2,089,500. On April 21, a call was made for the remainder of the ten-forty bonds, and on the 23d a call was made for $260,000, loan of 1858, thus completing the redemption of all outstanding redeemable bonds bearing interest at five per cent. On March 12, 1879, independent-treasury officers were authorized to exchange the ten-dollar certificates, authorized by the act of Feb. 26, 1879 (see below, § Refunding Certificates, in the statement of loans), at par for lawful money, and the Treasurer of the U. States was authorized to issue them upon the certificate of any national bank designated for the purpose. To facilitate and distribute the sale of these certificates, national banks and public officers were invited to become depositaries for this purpose, as authorized and provided by sections 3639 and 5153, Revised Statutes of the U. States. Each certificate was prepared in the denomination of $10, and bore interest at the rate of four per cent per annum from April 1, 1879, at which time the quarterly interest began on the four per cent bonds, into which the certificates were convertible in sums of $50, or its multiples. Any person subscribing could, at his option, have the certificates registered in his name on the books of the Department. Immediately upon the advance by the Department of the price of the four per cent bonds to one half of one per cent above par, the demand for these certificates greatly increased. Offers for them at a premium corresponding to the premium on the bonds into which they were convertible were received, but the act under which they were issued not only authorized but directed them to be issued in exchange for lawful money, thus apparently preventing the sale of them at a premium, and the offers were therefore declined. To bring them within the reach of small investors, on and after April 18, their sale was restricted to independent-treasury officers and public officers bonded for that purpose, and to sums not exceeding $100 at one time. Evasions of the intent of the law and instructions, however, with a view of immediate conversion of the certificates into bonds, soon became evident, and, on April 28, the officers selling the certificates were directed to refuse them when such evasion was manifest. At the same time commissions on the sales, if in large amounts, were greatly reduced, and the conversion of the certificates into bonds was postponed

* In the amount here stated as the outstanding principal of the public debt are included the certificates of deposit outstanding on the 30th of June, issued under act of June 8, 1872, amounting to $31,730,000, in 1873; $58,760,000 in 1874; $58,415,000 in 1875; $32,840,000 in 1876; $54,960,000 in 1877; $46,755,000 in 1878; and $30,370,000 in 1879, for which a like amount in U. States notes was on special deposit in the Treasury for their redemption, and added to the cash balance in the Treasury. These certificates, as a matter of accounts, are treated as a part of the public debt, but, being offset by notes held on deposit for their redemption, should properly be deducted from the principal of the public debt in making comparison with former years.

until July 1, 1879. The entire amount was, however, disposed of as rapidly as the certificates could be prepared, and before the close of the fiscal year. — Thus, from Nov 23, 1878, to Oct. 31, 1879, there were refunded $370,848,750 six per cent and $193,890,250 five per cent bonds of the U. States, into bonds bearing interest at four per cent, making an annual saving of interest hereafter of $9,355,877 50. — The entire transactions in refunding from 1870 to Oct 31, 1879, were as follows: —

Title of loan.	Rate per ct.	Amount refunded	Annual interest charge.
Loan of 1858	5	$14,217,000	$10,405,362 50
Ten-forties of 1864	5	193,890,250	
Five-twenties of 1862	6	401,143,750	71,234,322 00
Five-twenties of March, 1864	6	1,327,100	
Five-twenties of June, 1864	6	59,185,450	
Five-twenties of 1865.	6	160,144,500	
Consols of 1865	6	211,337,050	
Consols of 1867	6	316,423,800	
Consols of 1868	6	37,677,050	
Total		1,395,345,950	81,630,684 50

In place of the above bonds there have been issued bonds bearing interest as follows. —

Title of loan.	Rate per cent.	Total issued.	Annual interest charge.
		$	$
Funded loan of 1881	5	500,000,000	25,000,000
Funded loan of 1891	4½	185,000,000	8,325,000
Funded loan of 1907, including refunding certificates.	4	710,345,950	28,413,838
Total	....	1,395,345,950	61,738,838

making an annual saving hereafter in the interest charge on account of refunding operations of $19,900,846.50 (See pp. 782–787.)

National Fire-Insurance Co., located in New York City, organized in 1838. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $101,513.21; premiums, $154,350.80. Premiums received since the organization of the Co., $2,898,323.74; losses paid, $1,415,025.88; cash dividends paid to stockholders, $910,056.

National Fire-Insurance Co., located in Baltimore, Md. organized in 1850. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $24,941.19; premiums, $88,614.22. Premiums received since the organization of the Co., $1,713,826.05; losses paid, $954,347.92; cash dividends paid to stockholders, $331,584.75.

National Fire-Insurance Co., located in Hartford, Conn., organized in 1871. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $600,000; net surplus, $364,304.35; premiums, $235,937.51. Premiums received since the organization of the Co., $2,713,236.42; losses paid, $1,243,186.93; cash dividends paid to stockholders, $533,000.

National Life-Insurance Co., located in Montpelier, Vt., organized in 1850. *Statement*, Jan. 1, 1880: Assets, $2,250,584.68; liabilities, $1,507,963.16; gross surplus, $642,611.52; policies in force, 4,032, amounting to $8,306,052; premiums, $238,749.99; dividends paid to policy holders, $54,722.84.

National Life-Insurance Co. of the U. States of America, located in Chicago, Ill., organized in 1868. *Statement*, Jan. 1, 1880: Assets, $3,899,279.06; liabilities, $3,148,976.07; gross surplus, $750,302.99; policies in force, 7,931, amounting to $14,272,153; premiums, $396,634.73.

Native, a term applied to metallic ores which are pure metals.

Natrolite, a silicate of alumina and soda, which occurs in small mammillary fibrous masses of a white, yellowish, or grayish color, in Switzerland, Nova Scotia, etc. It takes a high polish and is used for ornaments.

Natron, a native, impure sesquicarbonate of soda, of which two kinds are obtained in Egypt, the white and the soltanee. It is employed in the manuf. of soap and glass, for bleaching and other purposes. It requires much refining before it becomes pure alkali.

Naturalist, a collector and dealer in objects of natural history.

Naturalization, a legal grant to a resident alien of the rights and privileges of an American-born citizen.

Nature Printing. See PRINTING.

Naugatuck R. R. runs from Naugatuck Junction to Winsted, Conn. This Co., located at Bridgeport, Conn., was chartered in 1845, and the road was opened in 1849. Capital stock, $2,000,000. Cost of road and equipment, $2,329,697.79.

Naut, a marine measure of length, used in the Mediterranean; 124 nauts = 145 miles.

Nautch-Girl, an Indian dancing-girl.

Nautical, relating to ships, navigation, or seamen.

Nautical-Instruments, telescopes, sextants, quadrants, compasses, and other instruments, for the use of navigators.

Naval, belonging to shipping.

Naval Architecture. See SHIP-BUILDING.

Naval Stores. The principal of these are tar, pitch, rosin, and turpentine, though other articles used in equipping vessels, such as sail-cloth and cordage, are sometimes included. Our exports of *N. S.* (chiefly rosin and turpentine) for the year 1879 amounted to 1,165,166 barrels, valued at $2,260,586 — in which total Great Britain enters for $427,421; Germany, $213,239; Holland, $196,341; Russia, $181,579; Belgium, $127,419; and France, $61,666. *N. S.* are principally exported from Wilmington, N. C., Charleston, S. C., New York, and San Francisco.

Nave, a short block of wood, forming the middle of a wheel, and pierced with a hole, to receive the axle or axle-tree. — The body of a church.

Navette, a smaller kind of colza, cultivated in France for the seed, for making oil. The seed is less abundant but more valuable than the larger kind.

Navigation, the art of managing a ship at sea. To understand the principles of *N.*, and their practical application, it is necessary that the mariner or navigator should be acquainted with the form and magnitude of the earth, the relative situation of the lines conceived to be drawn on its surface, and have charts of the coasts and maps of the harbors which he may have occasion to visit. He must also understand the use of the instruments by which the direction in which a ship is steered, and the distance which she sails, are ascertained; and be able to deduce from the data supplied by such instruments the situation of his ship at any time, and to find the direction and distance of any place to which it may be required that the ship should be taken.

The instruments needed, besides the compass, are a *quadrant* to measure the altitudes of the heavenly bodies, and a *sextant* to measure the distance between the moon and the stars. (See QUADRANT and SEXTANT.) The navigator should also be provided with logarithmic tables, in order to allow him to develop his observations; a copy of the "Nautical Almanac," to give him useful information with regard to the places and declination of the planets and stars; and, finally, he should be provided with the general and local charts applicable to his contemplated voyage. Having left port, the mariner, just when the last land is about to disappear, selects some conspicuous point, of which the latitude and longitude are known in his tables, and placing a compass in some elevated position,

Statement of the Outstanding Principal of the Public Debt of the United States, June 30, 1879.

	Length of Loan.	When Redeemable.	Rate of Interest.	Price at which sold.	Amount authorized.	Amount issued.	Amount outstanding
Old Debt. — Unclaimed dividends upon debt created prior to 1800, and the principal and interest of the outstanding debt created during the war of 1812, and up to 1837. (For detailed information in regard to earlier loans see Finance Report for 1876.)	....	On demand ..	5 and 6 per cent.	....	....	....	$57,665.00
Treasury Notes prior to 1846. — The acts of October 12, 1837 (5 Statutes, 201); May 21, 1838 (5 Statutes, 228); March 31, 1840 (5 Statutes, 370); February 15, 1841 (5 Statutes, 411); January 31, 1842 (5 Statutes, 469); August 31, 1842 (5 Statutes, 581); and March 3, 1843 (5 Statutes, 614), authorized the issue of Treasury notes in various amounts, and with interest at rates named therein, from 1 mill to 6 per centum per annum.	1 and 2 years	1 and 2 years from date.	1 mill to 6 per cent.	Par.........	....	....	82,525.35
Treasury Notes of 1846. — The act of July 22, 1846 (9 Statutes, 39), authorized the issue of Treasury notes in such sums as the exigencies of the government might require, the amount outstanding at any one time not to exceed $10,000,000, to bear interest at not exceeding 6 per centum per annum, redeemable one year from date. These notes were receivable in payment of all debts due the United States, including customs-duties.	1 year......	1 year from date.	1 mill and 5$\frac{2}{5}$ per cent.	Par.........	$10,000,000.00	$7,687,800 00	6,000.00
Mexican Indemnity. — A proviso in the civil and diplomatic appropriation act of August 10, 1846 (9 Statutes, 94), authorized the payment of the principal and interest of the fourth and fifth instalments of the Mexican indemnities, due April and July, 1844, by the issue of stock, with interest at 5 per centum, payable in five years.	5 years.....	Apr. and July 1849.	5 per cent..	Par.........	350,000.00	303,573.92	1,104.91
Treasury Notes of 1847. — The act of January 28, 1847 (9 Statutes, 118), authorized the issue of $23,000,000 Treasury notes, with interest at not exceeding 6 per centum per annum, or the issue of stock for any portion of the amount, with interest at 6 per centum per annum. The Treasury notes under this act were redeemable at the expiration of one or two years; and the interest was to cease at the expiration of sixty days' notice. These notes were receivable in payment of all debts due the United States, including customs-duties.	1 and 2 years	After 60 days' notice.	5$\frac{2}{5}$ and 6 per cent.	Par.........	23,000,000.00	26,122,100.00	950.00
Loan of 1847. — The act of January 28, 1847 (9 Statutes, 118), authorized the issue of $23,000,000 Treasury notes, with interest at not exceeding 6 per centum per annum, or the issue of stock for any portion of the amount, with interest at 6 per centum per annum, reimbursable after December 31, 1867. Section 14 authorized the conversion of Treasury notes under this or any preceding act into like stock, which accounts for the apparent over-issue.	20 years	Jan. 1, 1868 .	6 per cent..	.0125 to .02 per cent premium.	23,000,000.00	*28,207,000.00	1,250.00
Bounty-land Scrip. — The ninth section of the act of February 11, 1847 (9 Statutes, 125), authorized the issue of land-warrants to soldiers of the Mexican war, or scrip, at the option of the soldier, to bear 6 per centum interest per annum, redeemable at the pleasure of the government, by notice from the Treasury department. Interest ceased July 1, 1849.	Indefinite ...	July 1, 1849 .	6 per cent..	Par.........	Indefinite...	233,075.00	3,300.00
Texan Indemnity Stock. — The act of September 9, 1850 (9 Statutes, 447), authorized the issue of $10,000,000 stock, with interest at 5 per centum per annum, to the State of Texas, in satisfaction of all claims against the United States arising out of the annexation of the said State. The stock was to be redeemable at the end of fourteen years.	14 years	Jan. 1, 1865 .	5 per cent..	Par.........	10,000,000.00	5,000,000.00	21,000.00
Treasury Notes of 1857. — The act of December 23, 1857 (11 Statutes, 257), authorized the issue of $20,000,000 in Treasury notes, $6,000,000 with interest at not exceeding 6 per centum per annum, and the remainder with interest at the lowest rates offered by bidders, but not exceeding 6 per centum per annum. These notes were redeemable at the expiration of one year, and interest was to cease at the expiration of sixty days' notice after maturity. They were receivable in payment of all debts due the United States, including customs-duties.	1 year	60 days' notice.	5 and 5$\frac{1}{2}$ per cent.	Par.........	20,000,000.00	20,000,000.00	1,700.00
Loan of 1858. — The act of June 14, 1858 (11 Statutes, 365), authorized a loan of $20,000,000, with interest at not exceeding 5 per centum per annum, and redeemable any time after January 1, 1874.	15 years	Jan. 1, 1874..	5 per cent..	.0205 to .0703 per cent premium.	20,000,000.00	20,000,000.00	48,000.00
Loan of 1860. — The act of June 22, 1860 (12 Statutes, 79), authorized a loan of $21,000,000 (to be used in redemption of Treasury notes) with interest at not exceeding 6 per centum per annum, redeemable in not less than ten nor more than twenty years.	10 years	Jan. 1, 1871..	5 per cent..	Par to .0145 per cent premium.	21,000,000.00	7,022,000.00	10,000.00

Seven-thirties of 1861.—The act of July 17, 1861 (12 Statutes, 259), authorized a loan of $250,000,000, part of which was to be in Treasury notes, with interest at $7\frac{3}{10}$ per centum per annum, payable three years after date.	3 years	Aug. 19 and Oct. 1, 1864.	$7\frac{3}{10}$ per cent	Par	140,094,750.00	140,094,750 00	16,000 00
Five-twenties of 1862.—The act of February 25, 1862 (12 Statutes, 345), authorized a loan of $500,000,000 for the purpose of funding the Treasury notes and floating debt of the United States, and the issue of bonds therefor, with interest at 6 per centum per annum. These bonds were redeemable after five and payable twenty years from date. The act of March 3, 1864 (13 Statutes, 13), authorized an additional issue of $11,000,000 of bonds to persons who subscribed for the loan on or before January 21, 1864. The act of January 28, 1865 (13 Statutes, 425), authorized an additional issue of $4,000,000 of these bonds and their sale in the United States or Europe	5 or 20 years	May 1, 1867	6 per cent	Par	515,000,000.00	514,771,600.00	402,500.00
Legal-tender Notes —The act of February 25, 1862 (12 Statutes, 345), authorized the issue of $150,000,000 United States notes, not bearing interest, payable to bearer, at the Treasury of the United States, and of such denominations, not less than five dollars, as the Secretary of the Treasury might deem expedient, $50,000,000 to be in lieu of demand-notes authorized by the act of July 17, 1861; these notes to be a legal tender. The act of July 11, 1862 (12 Statutes, 532), authorized an additional issue of $150,000,000 United States Treasury notes, of such denominations as the Secretary of the Treasury might deem expedient, but no such note should be for a fractional part of a dollar, and not more than $35,000,000 of a lower denomination than five dollars; these notes to be a legal tender. The act of March 3, 1863 (12 Statutes, 710), authorized an additional issue of $150,000,000 United States notes, payable to bearer, of such denominations, not less than one dollar, as the Secretary of the Treasury might prescribe; which notes were made a legal tender. The same act limited the time at which Treasury notes might be exchanged for United States bonds to July 1. 1863. The amount of notes authorized by this act were to be in lieu of $100,000,000 authorized by the resolution of January 17, 1863 (12 Statutes, 822)	....	On demand	None	Par	450,000,000.00	†449,338,902.10	346,681,016.00
Loan of February, 1861 (1881s) —The act of February 8, 1861 (12 Statutes, 129), authorized a loan of $25,000,000, with interest at not exceeding 6 per centum per annum, reimbursable in not less than ten nor more than twenty years from the date of the act.	10 or 20 years	Jan. 1, 1881	6 per cent	Par	25,000,000.00	18,415,000.00	18,415,000.00
Treasury Notes of 1861.—The act of March 2, 1861 (12 Statutes, 178), authorized a loan of $10,000,000, with interest at not exceeding 6 per centum per annum, redeemable on three months' notice after July 1, 1871, and payable July 1, 1881. If proposals for the loan were not satisfactory, authority was given to issue the whole amount in Treasury notes, with interest at not exceeding 6 per centum per annum. The same act gave authority to substitute Treasury notes for the whole or any part of loans authorized at the time of the passage of this act. These notes were to be received in payment of all debts due the United States, including customs-duties, and were redeemable at any time within two years from the date of the act.	2 years 60 days	2 years after date. 60 days after date.	6 per cent	Par	22,468,100.00 12,896,350.00	35,364,450.00	3,000.00
Oregon War Debt.—The act of March 2, 1861 (12 Statutes, 198), appropriated $2,800,000 for the payment of expenses incurred by the Territories of Washington and Oregon in the suppression of Indian hostilities in the years 1855 and 1856. Section 4 of the act authorized the payment of these claims in bonds redeemable in twenty years, with interest at 6 per centum per annum.	20 years	July 1, 1881	6 per cent	Par	2,800,000.00	1,090,850.00	945,000.00
Loan of July and August, 1861 (1881s).—The act of July 17, 1861 (12 Statutes, 259), authorized the issue of $250,000,000 bonds, with interest at not exceeding 7 per centum per annum, redeemable after twenty years. The act of August 5, 1861 (12 Statutes, 313), authorized the issue of bonds, with interest at 6 per centum per annum, payable after twenty years from date, in exchange for 7 30 notes issued under the act of July 17, 1861. None of such bonds were to be issued for a sum less than $500, and the whole amount of them was not to exceed the whole amount of 7 30 notes issued under the above act of July 17. The amount issued in exchange for 7.30s was $139,321,350.	20 years	July 1, 1881	6 per cent	‡Par	250,000,000.00	50,000,000.00 139,321,350.00	189,321,350.00
Old Demand-notes.—The act of July 17, 1861, (12 Statutes, 259), authorized the issue of $50,000,000 Treasury notes, not bearing interest, of a less denomination than fifty dollars and not less than ten dollars, and payable on demand by the assistant treasurers at Philadelphia, New York, or Boston. The act of August 5, 1861 (12 Statutes, 313), authorized the issue of these notes in denomination of five dollars; it also added the assistant treasurer at St. Louis and the designated depositary at Cincinnati to the places where these notes were made payable The act of February 12, 1862 (12 Statutes, 338), increased the amount of demand-notes authorized $10,000,000	....	On demand	None	Par	60,000,000.00	60,000,000.00	61,470.00

* Including conversion of Treasury notes. † Highest amount outstanding January 30, 1864. ‡ $50,000,000 6 per cent stock issued at a discount of $5,338,768.09, being equivalent to 7 per cent.

Statement of the Outstanding Principal of the Public Debt of the United States, June 30, 1879. — Continued.

	Length of Loan.	When Redeemable.	Rate of Interest.	Price at which sold.	Amount authorized.	Amount issued.	Amount outstanding.
Temporary Loan — The act of February 25, 1862 (12 Statutes, 346), authorized temporary-loan deposits of $25,000,000, for not less than thirty days, with interest at 5 per centum per annum, payable after ten days' notice The act of March 17, 1862 (12 Statutes, 370), authorized the increase of temporary-loan deposits to $50,000,000. The act of July 11, 1862 (12 Statutes, 532), authorized a further increase of temporary-loan deposits to $100,000,000. The act of June 30, 1864 (13 Statutes, 218), authorized a further increase of temporary-loan deposits to not exceeding $150,000,000, and an increase of the rate of interest to not exceeding 6 per centum per annum, or a decrease of the rate of interest on ten days' notice, as the public interest might require	Not less than 30 days	After 10 days' notice.	4, 5, and 6 per cent.	Par.........	$150,000,000.00	....	$3,060 00
Certificates of Indebtedness. — The act of March 1, 1862 (12 Statutes, 352), authorized the issue of certificates of indebtedness to public creditors who might elect to receive them, to bear interest at the rate of 6 per centum per annum, and payable one year from date, or earlier, at the option of the government The act of May 17, 1862 (12 Statutes, 370), authorized the issue of these certificates in payment of disbursing officers' checks. The act of March 3, 1863 (12 Statutes, 710), made the interest payable in lawful money.	1 year	1 year after date.	6 per cent..	Par.........	No limit	$561,753,241.65	4,000.00
Fractional Currency. — The act of July 17, 1862 (12 Statutes, 592), authorized the use of postal and other stamps as currency, and made them receivable in payment of all dues to the United States less than five dollars The fourth section of the act of March 3, 1863 (12 Statutes, 711), authorized the issue of fractional notes in lieu of postal and other stamps and postal currency; made them exchangeable in sums not less than three dollars for United States notes, and receivable for postage and revenue stamps, and in payment of dues to the United States, except duties on imports, less than five dollars; and limited the amount to $50,000,000 The fifth section of the act of June 30, 1864 (13 Statutes, 220), authorized an issue of $50,000,000 in fractional currency, and provided that the whole amount of these notes outstanding at any one time should not exceed this sum.	....	On presentation.	None......	Par........	50,000,000.00	49,102,660.27	15,842,605.78
Loan of 1863. — The act of March 3, 1863 (12 Statutes, 709), authorized a loan of $900,000,000, and the issue of bonds, with interest at not exceeding 6 per centum per annum, and redeemable in not less than ten nor more than forty years, principal and interest payable in coin. The act of June 30, 1864 (13 Statutes, 219), repeals so much of the preceding act as limits the authority thereunder to the current fiscal year, and also repeals the authority altogether except as relates to $75,000,000 of bonds already advertised for.	17 years	July 1, 1881..	6 per cent..	Average premium of 4.13 per cent.	75,000,000.00	75,000,000.00	75,000,000.00
One-year Notes of 1863 — The act of March 3, 1863 (12 Statutes, 710), authorized the issue of $400,000,000 Treasury notes, with interest at not exceeding 6 per centum per annum, redeemable in not more than three years, principal and interest payable in lawful money, to be a legal tender for their face value.	1 year	1 year after date.	5 per cent..	Par.........	400,000,000.00	44,520,000.00	48,685.00
Two-year Notes of 1863. — The act of March 3, 1863 (12 Statutes, 710), authorized the issue of $400,000,000 Treasury notes, with interest not exceeding 6 per centum per annum, redeemable in not more than three years, principal and interest payable in lawful money, to be a legal tender for their face value.	2 years	2 years after date	5 per cent .	Par.........	400,000,000.00	166,480,000.00	37,500.00
Coin-Certificates. — The fifth section of the act of March 3, 1863 (12 Statutes, 711), authorized the deposit of gold coin and bullion with the Treasurer or any assistant treasurer, in sums not less than $20, and the issue of certificates therefor in denominations the same as United States notes; also authorized the issue of these certificates in payment of interest on the public debt. It limits the amount of them to not more than 20 per centum of the amount of coin and bullion in the Treasury, and directs their receipt in payment for duties on imports.	....	On demand ..	None.......	Par.........	Indefinite....	57,883,400.00	15,413,700.00
Compound-interest Notes. — The act of March 3, 1863 (12 Statutes, 709), authorized the issue of $400,000,000 Treasury notes, with interest at not exceeding 6 per centum per annum, in lawful money, payable not more than three years from date, and to be a legal tender for their face value. The act of June 30, 1864 (13 Statutes, 218), authorized the issue of $200,000,000	3 years	June 10, 1867, and May 15, 1868.	6 per cent compound.	Par.........	400,000,000.00	266,595,440.00	259,090 00

Treasury notes, of any denomination not less than \$10, payable not more than three years from date, or redeemable at any time after three years, with interest at not exceeding $7\frac{3}{10}$ per centum, payable in lawful money at maturity, and made them a legal tender for their face value to the same extent as United States notes; \$177,045,770 of the amount issued was in redemption of 5 per cent notes.							
Ten-forties of 1864.—The act of March 3, 1864 (13 Statutes, 13), authorized the issue of \$200,000,000 bonds, at not exceeding 6 per centum per annum, redeemable after five and payable not more than forty years from date, in coin.	10 or 40 years	March 1, 1874	5 per cent..	Par to 7 per cent prem.	200,000,000.00	196,117,300.00	138,425,150.00
Five-twenties of June, 1864.—The act of June 30, 1864 (13 Statutes, 218), authorized a loan of \$400,000,000, and the issue therefor of bonds redeemable not less than five nor more than thirty (or forty, if deemed expedient) years from date, with interest at not exceeding 6 per centum per annum, payable semi-annually in coin	5 or 20 years	Nov. 1, 1869..	6 per cent..	Par.........	400,000,000 00	125,561,300.00	71,800.00
Seven-thirties of 1864 *and* 1865.—The act of June 30, 1864 (13 Statutes, 218), authorized the issue of \$200,000,000 Treasury notes, of not less than \$10 each, payable at not more than three years from date, or redeemable at any time after three years, with interest at not exceeding $7\frac{3}{10}$ per centum per annum. The act of March 3, 1865 (13 Statutes, 468), authorized a loan of \$600,000,000, and the issue therefor of bonds or Treasury notes; the notes to be of denominations of not less than \$50, with interest in lawful money at not more than $7\frac{3}{10}$ per centum per annum. See, also, act January 28, 1865 (13 Statutes, 425).	3 years ...	Aug. 15, 1867 June 15, 1868 July 15, 1868	$7\frac{3}{10}$ per c't	Par.........	830,000,000.00	830,000,000.00	147,550.00
Navy-Pension Fund.—The act of July 1, 1864 (13 Statutes, 414), authorized the Secretary of the Navy to invest in registered securities of the United States so much of the Navy pension-fund in the Treasury January 1 and July 1 in each year as would not be required for the payment of naval pensions. Section 2 of the act of July 23, 1868 (15 Statutes, 170), makes the interest on this fund 3 per centum per annum in lawful money, and confines its use to the payment of naval pensions exclusively.	Indefinite...	....	3 per cent..	Par.........	Indefinite....	14,000,000.00	14,000,000.00
Five-twenties of 1865.—The act of March 3, 1865 (13 Statutes, 468), authorized the issue of \$600,000,000 of bonds or Treasury notes, in addition to amounts previously authorized; the bonds to be for not less than \$50, payable not more than forty years from date of issue, or after any period not less than five years; interest payable semi-annually, at not exceeding 6 per centum per annum when in coin, or $7\frac{3}{10}$ per centum per annum when in currency. In addition to the amount of bonds authorized by this act, authority was also given to convert Treasury notes or other interest-bearing obligations into bonds authorized by it The act of April 12, 1866 (14 Statutes, 31), construed the above act to authorize the Secretary of the Treasury to receive any obligations of the United States, whether bearing interest or not, in exchange for any bonds authorized by it, or to sell any of such bonds, provided the public debt is not increased thereby.	5 or 20 years	Nov. 1, 1870..	6 per cent..	Par.........	203,327,250.00	203,327,250.00	145,650.00
Consols of 1865.—The act of March 3, 1865 (13 Statutes, 468), authorized the issue of \$600,000,000 of bonds or Treasury notes, in addition to amounts previously authorized; the bonds to be for not less than \$50, payable not more than forty years from date of issue or after any period not less than five years, interest payable semi-annually, at not exceeding 6 per centum per annum when in coin, or $7\frac{3}{10}$ per centum per annum when in currency. In addition to the amount of bonds authorized by this act, authority was also given to convert Treasury notes or other interest-bearing obligations into bonds authorized by it. The act of April 12, 1866 (14 Statutes, 31), construed the above act to authorize the Secretary of the Treasury to receive any obligations of the United States, whether bearing interest or not, in exchange for any bonds authorized by it, or to sell any of such bonds, provided the public debt is not increased thereby.	5 or 20 years	July 1, 1870..	6 per cent..	Par.........	332,998,950.00	332,998,950 00	1,600,900.00
Consols of 1867—The act of March 3, 1865 (13 Statutes, 468), authorized the issue of \$600,000,000 of bonds or Treasury notes, in addition to amounts previously authorized; the bonds to be for not less than \$50, payable not more than forty years from date of issue or after any period not less than five years; interest payable semi-annually, at not exceeding 6 per centum per annum when in coin, or $7\frac{3}{10}$ per centum per annum when in currency. In addition to the amount of bonds authorized by this act, authority was also given to convert Treasury notes or other interest-bearing obligations into bonds authorized by it. The act of April 12, 1866 (14 Statutes, 31), construed the above act to authorize the Secretary of the Treasury to receive any obligations of the United States, whether bearing interest or not, in exchange for any bonds authorized by it, or to sell any of such bonds, provided the public debt is not increased thereby	5 or 20 years	July 1, 1872..	6 per cent..	Par.........	379,618,000.00	379,618,000 00	41,224,400.00

Statement of the Outstanding Principal of the Public Debt of the United States, June 30, 1879. — Continued.

	Length of Loan.	When Redeemable.	Rate of Interest.	Price at which sold.	Amount authorized.	Amount issued.	Amount outstanding.
Consols of 1868. — The act of March 3, 1865 (13 Statutes, 468), authorized the issue of $600,000,000 of bonds or Treasury notes, in addition to amounts previously authorized; the bonds to be for not less than $50, payable not more than forty years from the date of issue or after any period not less than five years; interest payable semi-annually at not exceeding 6 per centum per annum when in coin, or $7\frac{3}{10}$ per centum per annum when in currency. In addition to the amount of bonds authorized by this act, authority was also given to convert Treasury notes or other interest-bearing obligations into bonds authorized by it. The act of April 12, 1866 (14 Statutes, 31), construed the above act to authorize the Secretary of the Treasury to receive any obligations of the United States, whether bearing interest or not, in exchange for any bonds authorized by it, or to sell any such bonds, provided the public debt is not increased thereby.	5 or 20 years	July 1, 1873..	6 per cent..	Par........	$42,539,350.00	$42,539,350.00	$20,103,550.00
Three-per-cent Certificates. — The act of March 3, 1867 (14 Statutes, 558), authorized the issue of $50,000,000 in temporary-loan certificates of deposit, with interest at 3 per centum per annum, payable in lawful money, on demand, to be used in redemption of compound-interest notes. The act of July 25, 1868 (15 Statutes, 183), authorized $25,000,000 additional of these certificates for the sole purpose of redeeming compound-interest notes.	Indefinite...	On demand ..	3 per cent..	Par........	85,155,000.00	85,155,000.00	5,000.00
Five-per-cent Funded Loan of 1881 (*Refunding.*) — The act of July 14, 1870 (16 Statutes, 272), authorizes the issue of $200,000,000 at 5 per centum, principal and interest payable in coin of the present standard value, at the pleasure of the United States Government, after ten years; these bonds to be exempt from the payment of all taxes or duties of the United States, as well as from taxation in any form by or under State, municipal, or local authority. Bonds and coupons payable at the Treasury of the United States. This act not to authorize an increase of the bonded debt of the United States. Bonds to be sold at not less than par in coin, and the proceeds to be applied to the redemption of outstanding 5-20s, or to be exchanged for said 5-20s, par for par. Payment of these bonds, when due, to be made in order of dates and numbers, beginning with each class last dated and numbered. Interest to cease at the end of three months from notice of intention to redeem. The act of January 20, 1871 (16 Statutes, 399), increases the amount of 5 per cents to $500,000,000, provided the total amount of bonds issued shall not exceed the amount originally authorized, and authorizes the interest on any of these bonds to be paid quarterly.	10 years ..	May 1, 1881..	5 per cent..	Par........	....	486,043,000.00	490,446,200.00
The act of December 17, 1873 (18 Statutes, 1), authorized the issue of an equal amount of bonds of the loan of 1858, which the holders thereof may, on or before February 1, 1874, elect to exchange for the bonds of this loan.	....	....	....	....	....	13,957,000.00	
Four-and-one-half-per-cent Funded Loan of 1891. (*Refunding.*) — The act of July 14, 1870 (16 Statutes, 272), authorizes the issue of $300,000,000 at $4\frac{1}{2}$ per centum, payable in coin of the present standard value, at the pleasure of the United States Government, after fifteen years; these bonds to be exempt from the payment of all taxes or duties of the United States, as well as from taxation in any form by or under State, municipal, or local authority. Bonds and coupons payable at the Treasury of the United States. This act not to authorize an increase of the bonded debt of the United States. Bonds to be sold at not less than par in coin, and the proceeds to be applied to the redemption of outstanding 5-20s, or to be exchanged for said 5-20s, par for par. Payment of these bonds, when due, to be made in order of dates and numbers, beginning with each class last dated and numbered. Interest to cease at the end of three months from notice of intention to redeem. Under the act of January 20, 1871 (16 Statutes, 399), which authorized the increase of 5 per cent bonds to $500,000,000, the amount of the $4\frac{1}{2}$ per cents was reduced to $200,000,000.	15 years	Sept. 1, 1891..	$4\frac{1}{2}$ per cent.	Par........	.... 1,500,000,000.00	185,000,000.00	185,000,000.00
Four-per-cent Funded Loan of 1907. (*Refunding.*) — The act of July 14, 1870 (16 Statutes, 272), authorizes the issue of $1,000,000,000 at 4 per centum, payable in coin of the present standard value, at the pleasure of the United States Government, after thirty years; these bonds to be exempt from the payment of all taxes or duties of the United States, as well as from taxation	30 years	Sept 1, 1907..	4 per cent..	Par to $\frac{1}{2}$ per cent prem.	....	636,529,900.00	636,529,900.00

in any form by or under State, municipal, or local authority. Bonds and coupons payable at the Treasury of the United States. This act not to authorize an increase of the bonded debt of the United States. Bonds to be sold at not less than par in coin, and the proceeds to be applied to the redemption of outstanding 5-20s, or to be exchanged for said 5-20s, par for par. Payment of these bonds, when due, to be made in order of dates and numbers, beginning with each class last dated and numbered. Interest to cease at the end of three months from notice of intention to redeem.							
Five-per-cent Loan of 1881. (*For Silver.*)—The act of January 14, 1875 (18 Statutes, 296), authorizes the Secretary of the Treasury to use any surplus revenues from time to time in the Treasury not otherwise appropriated, and to issue, sell, dispose of, at not less than par, in coin, either of the description of bonds of the United States described in the act of July 14, 1870 (16 Statutes, 272), to the extent necessary for the redemption of fractional currency in silver coins of the denominations of ten, twenty-five, and fifty cents of standard value.	10 years	May 1, 1881..	5 per cent..	Par.........	Indefinite.......	17,494,150.00	17,494,150.00
Four-and-one-half-per-cent Loan of 1891. (*Resumption.*)—The act of January 14, 1875 (18 Statutes, 296), authorizes the Secretary of the Treasury to use any surplus revenues from time to time in the Treasury not otherwise appropriated, and to issue, sell, dispose of, at not less than par, in coin, either of the description of bonds of the United States described in the act of July 14, 1870 (16 Statutes, 272), for the purpose of redeeming, on and after January 1, 1879, in coin, at the office of the Assistant Treasurer of the United States in New York, the outstanding United States legal-tender notes when presented in sums of not less than fifty dollars.	15 years	Sept. 1, 1891..	4½ per cent.	Par to 1½ per cent prem.	Indefinite.......	65,000,000.00	65,000,000.00
Four-per-cent Loan of 1907. (*Resumption.*)—The act of January 14, 1875 (18 Statutes, 296), authorizes the Secretary of the Treasury to use any surplus revenues from time to time in the Treasury not otherwise appropriated, and to issue, sell, dispose of, at not less than par, in coin, either of the description of bonds of the United States described in the act of July 14, 1870 (16 Statutes, 272), for the purpose of redeeming, on and after January 1, 1879, in coin, at the office of the assistant treasurer of the United States in New York, the outstanding United States legal-tender notes when presented in sums of not less than fifty dollars.	30 years	Sept. 1, 1907..	4 per cent..	Par.........	Indefinite.......	30,500,000 00	30,500,000.00
Five-per-cent Loan of 1881. (*To pay J. B. Eads.*)—The act of March 3, 1875 (18 Statutes, 466), directs the Secretary of the Treasury to issue bonds of the character and description set out in the act of July 14, 1870 (16 Statutes, 272), to James B. Eads or his legal representatives in payment at par of the warrants of the Secretary of War for the construction of jetties and auxiliary works to maintain a wide and deep channel between the South Pass of the Mississippi River and the Gulf of Mexico, unless Congress shall have previously provided for the payment of the same by the necessary appropriation of money.	10 years	May 1, 1881..	5 per cent..	Par.........	Indefinite.......	500,000.00	500,000.00
Certificates of Deposit.—The act of June 8, 1872 (17 Statutes, 336), authorizes the deposit of United States notes without interest by banking associations in sums not less than $10,000, and the issue of certificates therefor in denominations of not less than $5,000; which certificates shall be payable on demand in United States notes at the place where the deposits were made. It provides that the notes so deposited in the Treasury shall not be counted as a part of the legal reserve, but that the certificates issued therefor may be held and counted by the national banks as part of their legal reserve, and may be accepted in the settlement of clearing-house balances at the places where the deposits therefor were made, and that the United States notes for which such certificates were issued, or other United States notes of like amount, shall be held as special deposits in the Treasury, and used only for the redemption of such certificates.	Indefinite ..	On demand ..	None	Par.........	No limit	64,780,000.00	30,370,000.00
Silver Certificates.—The act of February 28, 1878 (20 Statutes, 26, sec. 3), provides that any holder of the coin authorized by this act may deposit the same with the Treasurer or any assistant treasurer of the United States, in sums not less than ten dollars, and receive therefor certificates of not less than ten dollars each, corresponding with the denominations of the United States notes. The coin deposited for or representing the certificates shall be retained in the Treasury for the payment of the same on demand. Said certificates shall be receivable for customs, taxes, and all public dues, and, when so received, may be reissued.	Indefinite ..	On demand ..	None	Par.........	No limit.........	....	2,466,950.00
Refunding Certificates.—The act of February 26, 1879 (20 Statutes, 321), authorizes the Secretary of the Treasury to issue, in exchange for lawful money of the United States, certificates of deposit, of the denomination of ten dollars, bearing interest at the rate of four per centum per annum, and convertible at any time, with accrued interest, into the four per centum bonds described in the refunding act; the money so received to be applied only to the payment of the bonds bearing interest at a rate not less than 5 per centum, in the mode prescribed by said act.	Indefinite ..	Convertible into 4 per cent bonds.	4 per cent..	Par.........	No limit.........	39,398,110.00	12,848,210.00
						Total....	2,349,567,482.04

remote from any iron object which might disturb its polarity, proceeds to determine the bearing of the headland, and so estimate his distance from it, either by the progress made from it, or by the ready calculation of a practised eye. This is called, in nautical parlance, *taking the departure*, and it is, along with the time of making the observation, carefully noted in the log-book (a journal carefully kept on board, in which entries are made each day, of every circumstance connected with the ship, from the date of her leaving harbor until her return). The first thing which the mariner does after making that offing, which prudence dictates in order to avoid the dangers of the land, is to shape a correct course to the port for which he is bound. To commence, he searches in his chart to see if any rocks, shoals, or other obstacles are in the way of a direct route, and if so, he directs his course primarily, so as to avoid them; if not, the difference in latitude and longitude between the two ports being taken, the distance and course can be obtained by the aid of trigonometry. The shortest way to any two places on the face of the globe is the arc of the great circle passing through those two places. (See MERIDIAN.) At the first noon succeeding his departure, the mariner takes his reckoning; and this period being determined by the passage of the sun over the meridian, is, therefore, well chosen as the beginning of the day. The log-slate (a double-slate, on which events are marked down before being copied, at the close of the day, into the log-book) being marked, he copies the courses and distances run, if from head-winds, or other causes, they have been various. The departure from land is also esteemed a course, as is also the current, if there be any known one. He next proceeds to find the difference in latitude and departure from the meridian corresponding to each course, either by geometrical calculation, or, more expeditiously, by the tables; then he adds the several differences of latitude and departure, and if they be of different names — for instance, some north, some south, some east, or west — he deducts the less from the greater. With the remaining difference of latitude and departure, he not only finds the course and distances made good, but also the latitude and longitude; the difference of latitude being applied to the latitude left, either by adding or subtracting in sailing from or towards the equator, gives at once the latitude of the ship. The most general method of navigating is termed *dead reckoning;* but it is far from being as correct as might be desired. It does very well, however, for short voyages, made not far from land; but in long voyages remote errors accumulate so quickly, that the mariner would find himself far from having kept his right course, and, indeed, might be hundreds of miles away from it. The errors which attend navigation by dead reckoning often escape calculation, as they result from the bad steerage, lee-way, heave of the sea, unknown currents, and many other circumstances which imperceptibly cause the vessel to deviate greatly from her course. It becomes necessary, therefore, for the mariner, in long voyages, to resort to those immovable guides in the heavens that the Deity has placed. All the heavenly bodies are brought by the revolution of the earth daily to the meridian, at which time, if their latitude be measured, their declination, or distance from the equinox, being known, the latitude of the ship may be readily deduced; it may also be obtained from single or double altitudes of bodies not in the meridian, if the times be accurately known. But the meridian altitude of the sun is the one which furnishes the readiest and easiest method for obtaining the latitude. The method of obtaining the sun's meridian altitude may be described as follows: Furnished with a sextant, circle, or octant of reflection, the observer goes on deck, and having examined the adjustment of his instrument, proceeds to bring down the image of the sun, reflected by its mirror, until the lower limb just sweeps the horizon. He continues to follow and measure its ascent until it ceases to rise; the moment that it commences to fall, and the lower limb dips in the horizon, the sun has passed the meridian. The altitude marked by the index on the limb of the instrument is then read off and is next corrected. First, the observer adds the semi-diameter, in order to make the altitude apply to the centre of the object; he next subtracts the dip, to meet the errors caused by the extension of the horizon, owing to the rotundity of the earth and the elevation of his eye; also the refraction of the atmosphere, by which the object, when not vertical, is made to appear higher than its true place; lastly, he adds the parallax (a small correction, inconsiderable from the sun's distance), in order to reduce the calculation from the centre of the earth, from which point all calculations are made, and which is ever supposed to be the station of an observer. Having made all these corrections, which most mariners can easily do in a short time, by adding twelve minutes, the true meridian altitude of the sun will be gained. Taking this from 90° gives its zenith distance, or distance from that point in the heavens which is immediately over the observer. If the sun were forever on the equinoctial, the zenith distance would always be the latitude; but as it is only twice a year on it, and as his distance from it increases at times to 20°, it becomes necessary to take this distance (called his *declination*) into the calculation. The sun's declination is given in the almanac for the noon of each day; by correcting it for the time anticipated or elapsed, according as the sun comes first to him or to the *first meridian*, by his position E. or W. of it, the observer obtains the declination for noon at his own position. This declination applied to the zenith distance, by adding when the sun is on the same side, gives the true latitude. The knowledge of latitude is obviously more important to a thorough seaman, and it is desirable to know at once, and to be able to tell at any hour of the day, the position of a ship on the ocean. There are various methods for finding the longitude; but in all of them the great element is time. For, as the earth performs her diurnal revolution in 24 hours, from the time any given meridian is brought under the sun until it reaches it again, it follows that 24 hours and 360 degrees are both equal to a circle, and that the equator and other circles of longitude may be indifferently estimated by either of these divisions. Consequently, the difference in time between any two places is no other than the difference between the sun's coming to the respective meridians, or, in other words, their difference of longitude; and hence it follows that if we, by any means, simultaneously ascertain the time of the observation at the first meridian and the time on board ship, we shall have obtained the longitude. The easiest way of doing this is by means of a chronometer. To find the longitude by means of it, the mariner has only to take any observation of the sun or star, when rising or falling rapidly, and deduce the time of the ship; this, compared with the time at the first meridian, simultaneously given by the chronometer, at once determines the longitude. Ships generally carry three or four chronometers, in order to insure greater accuracy by means of comparing them with one another. The most expeditious plan for obtaining the longitude is undoubtedly by observing the eclipses of Jupiter's satellites. The theory with regard to the times of immersion and mersion at the first meridian is noted in the almanac, and these, compared with the times at which the observer notices the same by means of a good telescope, determine the longitude. The *lunar theory* is another method, and it consists in observing the distance of the moon from the sun and fixed stars, and by comparing the time of observation with that time at which the almanac shows a similar distance at the first meridian. In conclusion, it may be mentioned that there are other things to be borne in mind by the mariner, as every circumstance occurring in nature should be the means of insuring him guidance and information, — the drift of currents, the color of the sea (an admirable guide near coasts), the flight of birds, and many other simple circumstances. He should likewise ever carefully observe the barometer, in order to learn the changes of the weather. By the means which have been now fully stated, by common care, and by the will of Providence, the trackless ocean has highways upon it as plain to the initiated as the commonest turnpike-roads. See COLLISION AT SEA.

Navigation Laws. These laws are understood to comprise the various acts that have been passed, defining American ships, the way in which such ships are to be registered, the peculiar privileges enjoyed by them, and the conditions under which foreign ships shall be allowed to engage in the trade of the country, either as importers or exporters of commodities, or as carriers of commodities from one part of the country to another. These acts, which were passed by the American Congress in 1792–93, have never been materially altered, and are substantially the same as the English acts then in force. They are given in this work under COASTING TRADE, RECIPROCITY TREATY, REGISTRY, SHIPPING, TRANSPORTATION, etc.

Navigator, one who directs the course of a ship, or who is skilful in the art of navigation.

Navy, the whole of the ships of war belonging to a nation. See UNITED STATES.

Nead-End, a trade-name for the show-end of woollen cloths, kerseymeres, etc.

Neap-Tides, the lowest tides of the month, which fall at the middle of the moon's second and fourth quarters; the lowest neap-tide occurs four days before the full or change of the moon.

Neat, Net, something pure and unadulterated with any foreign mixture.

Neat Cattle, kine; animals of the ox kind. See CATTLE (NEAT).

Neat's-foot-Oil, an oil obtained by boiling down the feet of neat cattle, principally calves' and sheep's feet. It is chiefly used for softening leather, but is rarely found pure in the trade, being commonly adulterated with lard and other oils.

Nebraska, a N. W. central State of the American Union, bounded N. by Dakota, E. by Iowa and Missouri, S. by Kansas, and W. by Colorado and Wyoming Territory. It lies between lat. 40° and 43° N., lon. 95° 25′ and 104° W. The width from N. to S., 210 m.; extreme length, 412 m.; area, 75,905 sq. m. *N.* is divided into 64 counties. *Lincoln*, the capital, is situated on Salt Creek, a tributary of Platte River, at the intersection of the Burlington and Missouri River, the Midland Pacific, and the Atchison and Nebraska railroads, 50 m. S. W. of Omaha; pop. 8,000. *Omaha*, the largest city of the State, lies on Missouri River, opposite Council Bluffs, 490 m. W. by S. of Chicago. It has a considerable trade, and is the E. terminus of the Union Pacific, the Omaha and North-western, and the Omaha and South-western railroads; pop. 25,000. The other principal places are Nebraska City, Ashland, Beatrice, Brownville, Crete, Fremont, Grand Island, Kearney, North Platte, Plattsmouth, Seward, etc. Total population of the State, about 325,000.

The larger portion of *N.* consists of elevated and undulating prairies; there are no mountains or high hills, and the bottom-lands of the river valleys are generally flat. Above these, from 40 to 100 ft, are second bottoms or table-lands, sloping backward to the bluffs, which range with the general level of the country. These bluffs sometimes rise hundreds of feet above the riparian level; back of these, again, is the rolling prairie, well watered with springs and running streams, and covered with nutritious grasses. In the W. part of the State are "dunes," or sand-hills, which have been raised by the prevailing winds piling up the dry and loose materials of which they are shaped into their present picturesque forms. These hills have their elongated slopes to the winds, the opposite sides being quite steep, presenting the appearance of high billows all apparently drifting in the same direction. In remarkable contrast with the general appearance of *N.* is the tract known as the "Mauvaises Terres," in its W. part, 90 m. long and 30 wide, produced by some powerful agencies of denudation and degradation of the land. The Missouri, which forms the E. limit of the State, flows through a vast bottom bounded by high bluffs of trap-clay; and its channel, inclining to the W. shore, leaves the great bulk of the bottoms on the E. or Iowa side. The best portion of N. is the valley of the Platte, which extends from 100 to 200 m. on each side of that broad and swift but shallow river. Passing E., the first stream tributary to this beautiful valley is the Wood River, flowing in from the N., opposite Grand Island. The next is the Loup Fork, with its many branches, extending far into the W. region, and which empties its waters at Columbus. Lastly, the Elkhorn, rising in the N part of the State, commingles with the Platte, at least 250 m. N. E. of its source, and within 25 m. of the point where the Platte itself, after coursing its way from the mountains of Colorado, — the backbone of the continent, — is absorbed into the Missouri. With the exception of Salt Creek and its affluents, no stream falls into the Platte on the S. The S. portion is watered by the Great and Little Nemaha, the Big and Little Blue, and the Republican, with their many tributaries; all these rivers are deep and narrow when compared with the Platte — The S E. part of *N.* is underlaid by the coal-measures; but its coals are mostly "pinched out," and lie in very thin layers, which cannot be profitably worked. Good limestone, sandstone, and gypsum abound, and afford building materials. Fictile and other clays are common; and there are numerous salines, from which salt is obtained by evaporating the brines. — The country is marked by three classes of land: bottom-land, table, and inarable. The first, having a width of from 1 to 12 m., presents on its surface occasional heavy growths of timber, sometimes extending over the bluffs to the table-lands. Wood in *N.* is not abundant, consisting of fir varieties only; the cotton-wood is the most considerable. Oak, elm, hickory, and hackberry are also found. The soil of the arable portion of the State is a rich loam with an impregnation of lime, and varying from 2 to 10 ft in depth, the deepest being of course on the bottom-lands, which receive the débris from the bluffs. This loam is free from gravel, easily ploughed, very friable, resisting unusual wet or drought, and peculiarly adapted to the growth of corn and wheat. The common garden vegetables are in abundance, attaining an unusual size. Wild plums, grapes, cherries, and hops grow in profusion, and in the S. E. part of the State, apples, peaches, and pears are successfully cultivated. Beyond the 22d deg. of lon. the lands are not available for farming purposes except in the bottoms. E. of this line, not less than 25,000,000 acres are available for stock, grain, or general crops; 13,700,000 being first-class, 3,000,000 second-class, and 8,300,000 third-class land. The first embraces the bottoms and the equally productive prairies; the second comprises prairies which, although quite productive, are broken by water-worn drains; while the third-class land is subject to drought, and of a sandy character. The grazing region of the State comprises 23,000,000 acres, 12,500,000 of which are well watered, as are also 10,500,000 in the spring, but dry in summer. The State includes 61,000 acres of swamp, of which some 49,000 are reclaimable. — *N.* has of late years taken a prominent place as an agricultural State, about 3,000,000 acres having already been brought under cultivation. Indian corn, spring wheat, rye, oats, barley, potatoes, butter, sorghum, tobacco, wool, and live-stock are leading products. The relative value of these products for the year 1879 is given in this work under their different names Manufactures are carried on to some extent, but, as yet, chiefly for home wants. In 1879 *N.* had 10 national banks in operation, whose paid-up capital was $1,000,000. There were, besides, 48 State banks, savings-banks, and private bankers, with an aggregate capital of $503,595. The debt of the State amounted to $549,267; the assessed value of all taxable property was $75,359,799; the rate of taxation was 6 mills on each dollar, and the tax per capita, $1.51. In 1879 the State had 1,344 m. of railroads, operated by the corporations named in the following table: —

Fig. 364 — Seal of Nebraska.

Companies.	Total length of line.	Total length of line in *N.*
	Miles	Miles.
Atchison and Nebraska	148.68	110.42
Burlington and Missouri River	190.72	190.72
Covington, Columbus, and Black Hills	26 00	26.00
Fremont, Elkhorn, and Mississippi Valley	51.13	51.13
Nebraska	136.40	136 40
Omaha and Northern Nebraska	47 00	47 00
Omaha and Republican Valley	74.20	74 20
Omaha and South-western	47 22	47 22
Republican Valley	.40 84	40 84
St. Joseph and Denver City	227.00	86 00
Sioux City and Pacific	107.42	27 05
Union Pacific (including Omaha Bridge)	1,042.40	507.40

Neck, the narrow throat of a bottle; the part of an animal connecting the head with the body.

Neck-Band, the collar of a shirt.

Necklace, an ornament or circlet for the neck worn by females, made of various materials, pearls, or other gems, beads, glass, etc.

Neck-tie Retainer, a clasp for attaching the tie to the neck or to the button of the neck-band of the shirt.

Neck-Yoke, a wooden bar by which the end of the tongue of a carriage is supported.

Needle, a small instrument of steel, pointed at one end, with an eye at the other to receive a thread, used in sewing. *N.* are manuf. in many parts of England, but principally at Redditch, near Birmingham, which, it is said, produces between 20,000,000 and 30,000,000 gross of *N.* in a year. They are also extensively made at Borcette, a suburb of Aix-la-Chapelle, and in several parts of France. They are classified as *sharps*, *betweens*, and *blunts*, and vary in size from No. 1, to No. 10 for ordinary sewing *N.* They are imported mostly from England in colored papers of 25, 50, or 100; and packed in bundles containing 100 of these papers. Besides ordinary sewing *N.*, there are also sewing-machine *N.*, darning *N.*, knitting *N.*, saddler's *N.*, crochet *N.*, etc.

Imp. duty: all kinds for sewing, darning, or knitting, also for sail, 25 per cent; crochet, bone, ivory, or horn, 35 per cent; for knitting or sewing machines, $1 per 1,000, and 35 per cent.

Manuf. This manufacture illustrates the wonderful amount of work that can be given for a small sum when the demand is

enormous, a *N.* requiring to be manipulated by no fewer than 120 workmen before it is ready for the housewife. The first operation which has to be gone through is to reduce the best steel, by means of a wire-drawing machine, to the suitable diameter of the needle. The steel wire is brought in bundles to the manufactory, where it is tested by being reheated and plunged into cold water, after which it is snapped between the fingers, in order to ascertain its quality. The wire that is the most brittle is kept for a peculiar kind of needle, and the rest which has passed the test is calibred, in order to see whether it is equally thick all through and of the required gauge. The coils of wire are then cut by a pair of mechanical shears into pieces of about eight feet long, and again into the requisite needle-length. In order to cut 120 wires, only two successive incisions are requisite, and, consequently, the shears, by striking 21 blows in a minute, cut in 10 hours fully 400,000 ends of steel wire, which produce more than 800,000 needles. After the wires are cut, being more or less bent, they require to be straightened; and the operation is thus performed: They are enclosed, from 5,000 to 6,000 at a time, in two strong iron rings, and the bundle is placed upon a flat, smooth bench covered with a cast-iron plate, which has two grooves in it to receive the projecting circumference of the rings. Above the bundle is then placed another plate or rule, which has likewise two grooves to receive the rings, and by pressing this down two or three times the wires are immediately straightened. The needles, now in their embryo state, are then taken to the pointing-house, where by means of some thirty grindstones driven by a water-wheel they are to be sharpened. The workman seats himself in front of the grindstone (which, on account of the rapidity of its revolutions, is enclosed with iron plates or bands, having slits between for the wire to be applied to the stone), and seizing fifty or sixty wires between the thumb and forefinger of his right hand, presents one end of the bundle to the grindstone, by which means the ends are made conical. This operation is termed *roughing down*, and is performed without the aid of water; by which means the steel-dust seriously damages the eyes and lungs of the workmen. There are many inventions for preventing this cause of bad health to the *N.*-workers; but they seldom adopt any precautions, preferring to go along on the old plan, and to do as their fathers did before them. The wires, being thus pointed, are then transferred to the first workshop, and are cut into two pieces each. These pieces have, of course, the head rather rough, and require the roughness to be removed by filing, several being held together at once in a sort of flat vice. The needles having become a little bent by all these processes, they are rolled to and fro on a flat plate by a sort of file. The *N* are then brought to a red heat, plunged into cold water or oil, and then gradually heated and cooled again to bring them to the proper temper. They are next *scoured*, to get rid of the filmy oxide on the surface. Fifty thousand of them, or so, are wrapped in canvas coverings, with emery, oil, putty, powder, and soft soap, and rolled under heavy pressure until they have rubbed each other clean, smooth, and bright. The best *N.* are *drilled*, to obtain the smoothness of eye just adverted to; and this is done after the scouring. Every *N.* is applied successively to an exquisitely fine drill, rotating rapidly, in such a way as to round off the edges of the eye. The points are then sharpened and polished, first on a rotating hone, then on a buff-leather wheel. Thus it will be seen that manual dexterity is the chief agent in *N.*-making, steam-power being employed only to a limited extent. The cheaper *N.* do not go through so many processes as are here described; whereas *gold-eyed N.* have to go through a process of metal-gilding. The finished *N.* are worth about fourteen times as much as the steel wire of which they are made. *N.*-making machines have of late years been introduced, by which *N.* are formed from the roll of wire without the intervention of hand labor.

Needle-Bar, the reciprocating bar of a sewing-machine to whose end the needle is attached.

Needle-Book, slips of flannel to stick needles in, with covers in the form of a book.

Needle-Box, a small fancy box for keeping papers of needles in.

Needle-Case, a lady's workcase in which needles are kept according to sizes or numbers.

Needle-File, a long, round, narrow file used by jewelers.

Needle-Gun. See GUN.

Needle-Threader, a device, of which there are many kinds, to assist in passing a thread through the eye of a needle.

Needle-Work, embroidery, lace, all articles worked by the needle; but the term is chiefly applied to fancy or ornamental work.

Needle-Wrapper, a case or housewife to hold needles for the pocket or work-table.

Negative, a photographic picture in which the lights and shadows of the natural object are transposed; the high lights being black, and the deep shadows transparent, or nearly so. Negatives are taken on glass and paper by various processes, and should indicate with extreme delicacy, and in reverse order, the various gradations of light and shade which occur in a landscape or portrait. A negative differs from a positive inasmuch as in the latter case it is required to produce a deposit of pure metallic silver to be viewed by *reflected* light; while in the latter, density to *transmitted* light is the chief desideratum; accordingly, inorganic reducing and retarding agents are employed in the development of a positive, while those of organic origin are used in the production of a negative. The value of a negative consists in the power it gives of multiplying positive proof.

Negligee, a long necklace, usually of coral.

Negotiable Paper, such documents as are freely assignable from one to another, as bills of exchange, promissory notes, drafts at sight or on time, and checks on banks. It is essential to the negotiability of a bill between all persons, except the government, that the words "payable to order," or "to bearer," or other equivalent words, be used, authorizing the payee to assign or convey the same to third parties. This mode of transfer depends upon the form in which it is made negotiable. If payable to the bearer, then it may be transferred by mere delivery; but if originally payable to a person or his order, then it is properly transferable by indorsement, because in no other way will the transfer convey a legal title. See BILL OF EXCHANGE, INDORSEMENT, EXCHANGE, etc.

Negotiant, a French merchant or trader.

Negotiate, to transact business; to bargain or exchange; to put securities into circulation.

Negro-Corn, a West-Indian name for the Turkish millet or dhurra.

Negrohead-Tobacco, tobacco softened with molasses or sirup, and pressed into cakes, generally called Cavendish.

Negus, a drink of wine and warm water, sweetened with sugar, and flavored with lemon and nutmeg.

Neomonoscope, an instrument for magnifying photographs.

Nepaul Paper, a strong unsized paper, made in Nepaul (an independent State of N. Hindostan), from the pulverized bark of the *Daphne papyracea*.

Nephrite. See JADE.

Neptune Fire and Marine Insurance Co., located in Boston, Mass., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $300,000; net surplus, $127,080.64; premiums, $64,936.60. Premiums received since the organization of the Co., $1,334,580.60; losses paid, $839,062.40; cash dividends paid to stockholders, $180,000.

Neroli, an elegant perfume extracted from the flowers of a peculiar orange, small in size but very aromatic, a native of Italy. Neroli is an essential oil, obtained by distillation from the orange-blossoms, and far superior to the pungent article known as the oil of orange-peel (*Oleum aurantii*), which is too frequently substituted for this delicate perfume. *Imp.* duty, 50 per cent.

Nest, a number of buckets, tubs, baskets, or boxes, of different sizes, packed one within the other next larger, for the convenience of transportation. — A connected series of cog-wheels or pulleys. — A place for hens to lay.

Net (see also NEAT), beyond all charges or outlay, as net profits; the clear amount, without any further abatement for discount, as net proceeds;

clear of all deductions, as net weight, — which is to say, the weight without tare.

Net [Fr. *filet;* Ger. *Netz*], a textile fabric of knotted meshes for catching fish and for other purposes. The various kinds of *net* used by fishermen are humble imitations of the beautiful *bobbin-net* made into lace; or rather, the latter is made by improvements on the machinery employed in making nets. The thread is usually a twine of hemp or flax; but jute, cotton, and other fibrous materials may be substituted. The texture differs from ordinary woven fabrics in two ways, — the largeness of the meshes or open spaces, and the tying of a kind of knot at every intersection of the twine. The size and the shape of the mesh, as well as the thickness of the twine, vary with the purposes to which the net is to be applied: the fisherman establishes a difference between *seine*, *trawl*, and *drift* nets; the bird-catchers and the hunters of animals have various kinds; gardeners have nets with different sizes of mesh to cover their plants; and special sorts are used in several trades. Nets are usually made by hand, with the aid of a few simple but peculiar tools. There are, however, *net-making machines* in use. The hemp is heckled, carded, roved, and spun into yarn or twine; and then a netting-loom, acting somewhat on the principle of the stocking-frame, makes up the twine into netting by the aid of sinkers, needles, bobbins, shuttles, and other small apparatus of a curious kind. It is found that, for fishing, a net made of cotton is more durable than one made of hemp, — a fact not credited until experiments had made it manifest; and it is also proved that finer and lighter nets can be made of cotton. The introduction of machinery was partly the cause, partly the consequence, of this change of material, seeing that cotton nets cannot be well made by hand.

Imp. duty: fishing nets, dip or scoop (cotton), 35 per cent; (flax), 40 per cent. — Nets for the head, or hair, of silk and gum-elastic, 50 per cent; the same, of wool, worsted, or mohair (see WORSTED)

Netherlands. See HOLLAND.

Net Proceeds, the amount or sum which goods produce after every charge is paid.

Netting, the process of forming meshes, whether for fancy-work or for fishing, garden, and other nets of a larger kind. See NET.

Netting-Needle, a long needle with a slit at each end to pass the thread through, used by females for netting.

Nettings, in a ship, a sort of grates made of small ropes seized together with rope-yarn, or twine, and fixed upon the quarters and in the tops. They are sometimes stretched upon the ledges from the waist-trees to the roof-trees, from the top of the forecastle to the poop, and sometimes are laid in the waist of a ship to serve instead of gratings.

Nettle, the common name of the genus *Urtica*, consisting of plants well known for their stinging hairs. The fibre of the *N.* plants is superior to that of flax; but it has been neglected on account of the difficulty of separating it. The ramie, or false nettle, belongs to another genus. See RAMIE.

Nettle-Cloth, a very thick tissued cotton, which is japanned and prepared as a substitute for leather, particularly for the peaks of caps, waist-belts, etc.

Nettle-Tree, the *Celtis australis*, which yields a compact wood between oak and box for density. It takes a high polish, and is used by the French, under the name of Micocoulier, or Perpignan wood, for flutes and for carving.

Net-Weight, the true weight of merchandise, after allowance has been made for the cask, bag, or enclosure. The gross weight is the actual weight of goods and package.

Neufchâtel Cheese. See CHEESE.

Neutrality, the impartial position maintained by one nation with regard to others which are at war. The rights and duties which belong to a state of *N.* form a very interesting title in the code of international law. They ought to be objects of particular study in this country, inasmuch as it is our true policy to cherish a spirit of peace, and to keep ourselves free from those political connections which would tend to draw us into the vortex of European contests. A nation that maintains a firm and scrupulously impartial *N.*, and commands the respect of all other nations by its prudence, justice, and good faith, has the best chance to preserve unimpaired the blessings of its commerce, the freedom of its institutions, and the prosperity of its resources. Belligerent nations are interested in the support of the just rights of neutrals, for the intercourse which is kept up by means of their commerce contributes greatly to mitigate the evils of war. The public law of Europe has established the principle, that, in time of war, countries not parties to the war, nor interposing in it, shall not be materially affected by its action; but they shall be permitted to carry on their accustomed trade, under the few necessary restrictions which we shall hereafter consider. A neutral has a right to pursue his ordinary commerce, and he may become the carrier of the enemy's goods, without being subject to any confiscation of the ship, or of the neutral articles on board; though not without the risk of having the voyage interrupted by the seizure of the hostile property. As a neutral has a right to carry the property of enemies in his own vessel, so, on the other hand, his own property is inviolable, though it be found in the vessels of enemies. But the general inviolability of the neutral character goes further than merely the protection of neutral property. It protects the property of the belligerents when within the neutral jurisdiction. It is not lawful to make neutral territory the scene of hostility, or to attack an enemy while within it; and if the enemy be attacked, or any capture made, under neutral protection, the neutral is bound to redress the injury, and effect restitution. — A neutral has no right to inquire into the validity of a capture, except in cases in which the rights of neutral jurisdiction were violated; and, in such cases, the neutral power will restore the property, if found in the hands of the offender, and within its jurisdiction, regardless of any sentence of condemnation by a court of a belligerous captor. It belongs solely to the neutral government to raise the objection to a capture and title, founded on the violation of neutral rights. The adverse belligerent has no right to complain when the prize is duly libelled before a competent court. If any complaint is to be made on the part of the captured, it must be by his government to the neutral government, for a fraudulent, or unworthy, or unnecessary submission to a violation of its territory, and such submission will naturally provoke retaliation. Though a belligerent vessel may enter within neutral jurisdiction for hostile purposes, she may, consistently with a state of *N.*, until prohibited by the neutral power, bring her prize into a neutral port, and sell it. The neutral power is, however, at liberty to refuse this privilege, provided the refusal be made, as the privilege ought to be granted, to both parties, or to neither. — It is also a principle of the law of nations relative to neutral rights that the effects of neutrals, found

on board of enemy's vessels, shall be free; and it is a right as fully and firmly settled as the other, though, like that, it is often changed by positive agreement.

The two distinct propositions, that enemy's goods found on board a neutral ship may lawfully be seized as prize of war, and that the goods of a neutral found on board of an enemy's vessel were to be restored, have been explicitly incorporated into the jurisprudence of the U. States, and declared by the Supreme Court to be founded in the law of nations. The rule, as it was observed by the court, rested on the simple and intelligible principle, that war gave a full right to capture the goods of an enemy, but gave no right to capture the goods of a friend. The neutral flag constituted no protection to enemy's property, and the belligerent flag communicated no hostile character to neutral property. The character of the property depended upon the fact of ownership, and not upon the character of the vehicle in which it is found. The principal restriction which the law of nations imposes on the trade of neutrals is the prohibition to furnish the belligerent parties with warlike stores, and other articles which are directly auxiliary to warlike purposes. Such goods are denominated contraband of war; but in the attempt to define them, the authorities vary, or are deficient in precision, and the subject has long been a fruitful source of dispute between neutral and belligerent nations. In the time of Grotius, some persons contended for the rigor of war, and others for the freedom of commerce. As neutral nations are willing to seize the opportunity which war presents, of becoming carriers for the belligerent powers, it is natural that they should desire to diminish the list of contraband as much as possible. Grotius distinguishes between things which are useful only in war, as arms and ammunition, and things which serve merely for pleasure, and things which are of a mixed nature, and useful both in peace and war. He agrees with other writers in prohibiting neutrals from carrying articles of the first kind to the enemy, as well as in permitting the second kind to be carried. As to articles of the third class, which are of indiscriminate use in peace and war, as money, provisions, ships, and naval stores, he says that they are sometimes lawful articles of neutral commerce, and sometimes not; and the question will depend upon circumstances existing at the time. The ordinary penalty of carrying contraband is confiscation of cargo, but where the capture is only justified by special circumstances, or, as it is sometimes expressed, where the contraband is "conditional," and where the cargo is ordinary neutral produce, and there is perfect *bona fides* of the owner, the ship is merely carried in for preemption, which means the owner's value *plus* 10 per cent, with indemnity for freight and expenses of detention. Anciently, in cases of absolute contraband, both ship and cargo were forfeited; it is said Russia still does this. The right of preemption (*droit d'achat*) is stated by Lord Stowell to apply to all cargoes whatever bound for an enemy's port; and it is settled that any attempt at fraud, as false papers, or a concealed destination, will disentitle the owners to compensation. The same circumstances occurring in the case of a cargo of absolute contraband, even where the ship does not belong to the owner of the contraband, may forfeit the ship. It will be remembered that the blockade runners of our civil war raised very nice questions on this point. It was impossible to prove that these vessels after leaving Nassau were not going to Matamoras in Mexico, for they had only a floating intention of "running." The question, therefore, which came before the Supreme Court of the U. States in the "Bermuda" and "Peterhoff" cases was whether the interposition of a neutral port between the neutral point of departure and the belligerent destination did protect the cargo which was admitted to be contraband. There could be little doubt that the goods went straight through Texas to the Confederate States. But in several cases these cargoes were not condemned. The "Peterhoff's" cargo was army boots, artillery harness, regulation blankets, chloroform, and quinine. Where the shipowner is innocent and does not own the cargo, he merely loses his freight and expenses. Contraband articles also involve innocent parts of a cargo in confiscation when both belong to one owner. The U. States and Prussia are the only powers that have chosen the bold plan of entirely renouncing by treaty between themselves the right of confiscation, for which they have substituted an unlimited right of stoppage and detention and appropriation, subject to full compensation. This is an arrangement which may probably become more common, and will of course much weaken the effects of the law of contraband. It is impossible to prevent the seizure of private property in war, but it has been suggested that the value should be at once paid over by the captor's government to the neutral government for distribution. In order to enforce the rights of belligerent nations against the delinquencies of neutrals, and to ascertain the real as well as assumed character of all vessels on the high seas, the law of nations arms them with the practical power of visitation and search. The duty of self-preservation gives to belligerent nations this right. It is founded upon necessity, and is strictly and exclusively a war right, and does not rightfully exist in time of peace, unless conceded by treaty. All writers upon the law of nations, and the highest authorities, acknowledge the right in time of war as resting on sound principles of public jurisprudence, and upon the institutes and practice of all great maritime powers. And if, upon making the search, the vessel be found employed in contraband trade, or in carrying enemy's property or troops or despatches, she is liable to be taken and brought in for adjudication before a prize court. This right of search is confined to private merchant vessels, and does not apply to public ships of war. Their immunity from the exercise of any civil or criminal jurisdiction but that of the sovereign power to which they belong is uniformly asserted, claimed, and conceded. A contrary doctrine is not to be found in any jurist or writer on the law of nations, or admitted in any treaty; and every act to the contrary has been promptly met and condemned. A neutral is bound, not only to submit to search, but to have his vessel duly furnished with the genuine documents requisite to support her neutral character. The most material of these documents are, the register, passport or sea letter, muster-roll, log-book, charter-party, invoice, and bill of lading. The want of some of these papers is strong presumptive evidence against the ship's *N.*; yet the want of any one of them is not absolutely conclusive. "*Si aliquid ex solemnibus deficiat; cum equitas poscit subveniendum est.*" The concealment of papers material for the preservation of the neutral character justifies a capture and carrying into port for adjudication, though it does not absolutely require a condemnation. It is good ground to refuse cost and damages on restitution, or to refuse further proof to relieve the obscurity of the case, where the cause labored under heavy

doubts, and there was *prima facie* ground for condemnation independent of the concealment. The spoliation of papers is a still more aggravated and inflamed circumstance of suspicion. That fact may exclude further proof, and be sufficient to infer guilt; but it does not in England, as it does by the maritime law of other countries, create an absolute presumption *juris et de jure;* and yet, a case that escapes with such a brand upon it is saved so as by fire. The Supreme Court of the U. States has followed the less rigorous English rule, and held that the spoliation of papers was not, of itself, sufficient ground for condemnation, and that it was a circumstance open for explanation, for it may have arisen from accident, necessity, or superior force. See BLOCKADE, PRIVATEER, etc.

Nevada, one of the Pacific States of the American Union, is situated between lat. 35° and 42° N., lon. 114° and 120° W. It is bounded N. by Oregon and Idaho, W. by California, S. by California and Arizona, E. by Arizona and Utah, comprising the centre of the great elevated basin extending from the Rocky Mountains W. to the Sierra Nevada range. Extreme length N. and S. 483 m.; maximum width, 323 m.; area 104,125 sq. m. It is divided into 14 counties. *Carson City*, the capital, is situated in lat. 39° 10′ N., lon. 119° 43′ W., on the Virginia and Truckee Railroad, 31 m. S., of Reno; it has a U. States mint; pop. 4,000. *Virginia City*, the commercial metropolis, is built on the famous Comstock lode, on the E. slope of Mount Davidson, 21 m. N. N. E. of Carson City, about 190 m. (direct line) from San Francisco. It is a terminus of the Virginia and Truckee Railroad, which connects with the Central Pacific Railroad at Reno; pop. 10,000. The other principal places are Austin, Dayton, Elko, Gold Hill, Hamilton, Pioche, Reno, Silver City, and Treasure. Total pop. of the State, about 60,000.

A peculiar feature of *N.* is the remarkable uniformity with which mountain and valley succeed each other in almost parallel lines nearly throughout its whole extent, the mountains being rocky and but sparsely covered with herbage or timber, and the valleys generally dry, sandy plains, interspersed with salt and alkali flats, also intersected with beautiful, broad, shallow streams, bordering on which are wide belts of alluvial formation, covered by luxuriant herbage varied with well-grown timber, the soil possessing elements of the richest fertility. The Sierra Nevada range of mountains, within the W. boundaries of the State, has an elevation of from 7,000 to 13,000 ft. above sea-level, and is covered with dense forests, the trees being principally varieties of evergreens of species abounding on the Pacific coast, many of them attaining to extraordinary circumference and altitude. The timber of the interior is mainly composed of cotton-wood, birch, willow, dwarf-cedar, nut pine, or piñon, and other similar species, generally soft in texture, and of small dimensions, but very useful for fuel in the absence of harder and larger timber. The mountains are often intersected by ravines, constituting passes possessing great natural advantages for the construction of wagon-roads and railroads, many of them furrowing the vast piles of granite and limestone at a level but slightly above that of the surrounding plains. These gulches are generally watered by streams flowing throughout the year, which often spread out over a wide section of fertile alluvion covered by luxuriant vegetation as they reach the valleys; forming a natural irrigating process, which supplies, to a great extent, the necessity created by scarcity of rain at certain seasons of the year, and the aridity caused by the surface of the earth being above the point of dew condensation. The rivers of *N.* are generally very shallow and unnavigable, with hurried currents and occasional rapids, although there is not a cascade or cataract in the State. The waters are generally wholesome and palatable throughout their entire course, while those of the mountain rills are always excellent. All the lakes, as well as the larger and some of the smaller streams, contain an abundance of fish, some varieties of which, especially the trout in the mountain brooks, are unsurpassed in delicacy. The climate of *N.*, considering the general elevation of the country above sea-level, is mild, not being subject to great extremes either of heat or cold. The days of summer are not warmer than on the E. side of the Rocky Mountains, while the nights are uniformly cool and refreshing. The winters in the valleys are less severe than in N. New York or New England, and but little snow falls except on the mountain ranges. Not much rain falls between April and Oct. in the N. and W. part of the State. In the S. and E. there is a greater rainfall, and showers are not unusual during the summer months. The maximum quantity of water falls during the autumn and winter. — Not only the precious metals, but also minerals possessing value from their use in the mechanical arts and in domestic economy, are found in the State, many of the latter existing in such abundance as cannot fail to render them of great importance when better facilities for transportation to the localities of manufacture shall have been introduced. Among these may be mentioned vast beds of salt, ores of iron and copper rich in these metals; beds of sulphur, from which this substance can often be obtained quite pure, although it is sometimes combined with calcareous deposits; seams of lignite, and, possibly, true coal; yet, so far as explored, *N.* is not a strongly marked carboniferous region; cinnabar, gypsum, manganese, plumbago, kaolin, and other clays, useful in the making of pottery and fire-brick; mineral pigments of many kinds; soda, nitre, alum, magnesia, platinum, zinc, tin, galena, antimony, nickel, cobalt, and arsenic, besides various rocks useful for building purposes, as limestone, sandstone, granite, marble, and slate. The salt-beds constitute not only an important feature in the chorography of the State, but also form a considerable item in the economical resources, furnishing a great requisite for the reduction of most of the gold and silver ores. They sometimes extend over hundreds of acres, with strata each about a foot in thickness, separated by thin layers of clay, the beds being encompassed by belts of alkali lands. The gold and silver mines of *N.*, thus far in the history of the settlers of the State, have been the great source of its wealth and the prime inducement for its settlement. Since the discovery of these mines in 1859, down to 1879, they have produced above $100,000,000 gold, and $200,000,000 silver, exceeding by far the product of California. In 1878 the mines of *N.*, 197 in number, produced $47,676,863 (gold, $19,546,513; silver, $47,676,863), which was more than half of the total production in all the U. States. The following table shows the proportion contributed by each county in that enormous production: —

Fig. 365. — SEAL OF NEVADA.

Name of County.	Ores.		Tailings.	
	Tons.	Value.	Tons.	Value.
		$		$
Eureka...........	125,934	5,984 326.44	......	....
Esmeralda	19,986	844,791.57	......	....
Elko	15,607	1,472,180.43	225	3,375.00
Humboldt	5,989	206,616.22	18,075	90,737 50
Lander...........	5,720	582,584.45	......	....
Lyon	......	....	90,294	609,632.63
Lincoln...........	9,022	477,250.40	20,621	154,580 28
Nye	25,169	805,509.55	377	6,743.43
Storey............	508,536	34,967,307.34	83,563	811,040.45
White Pine........	11,861	660,188.14	......	....
Total	727,826	46,000,754.54	213,155	1,676,109.29
Total ores.......	....	....	727,826	46,000,754.54
Total tailings....	....	... .	213,155	1,676,109.29
Grand total ...	......	....	940,982	47,676,863.83

The two most productive mines are *The California* and *The Consolidated Virginia Mine*, in Storey Co., which are worked by two separate companies on the Comstock lode, within an area representing a surface of less than 10 acres. Their gross products in bullion for the year 1878 were as follows: —

California mine..................................	$17,640,060
Consolidated Virginia mine........................	15,461,178
Total...............................	$33,101,238

The interest manifested in agriculture, horticulture, and stock-raising throughout *N.* has materially increased during the past few years. The ascertained capacity of so large a portion of the lands for the production of fine crops of cereals, vegetables, and fruits is astonishing, in view of the former general impression that these soils were totally incapable of producing any vegetation of a higher grade than tule, buffalo-grass, and wild sage. The soil in the vicinity of most of the streams is found to be rich alluvion of great depth, formed of

disintegrated rock, clay washings, and vegetable débris from the forest-covered mountains, and, on account of its light, friable condition, it is readily permeated by moisture from the intersecting water-courses, thus obviating the necessity of artificial irrigation. The tule and other swamps are found to be easily reclaimable by draining, and employing the surplus water in irrigation of higher adjacent lands; the rich, black mould, formed of the decayed vegetable growth of centuries, united with washings of limestone, granite, and clay, from the mountains, being relieved of superfluous water and allowed contact with the air, soon became sufficiently azotized to produce the heaviest crops of field or garden produce. The arid plains, upon which the only indigenous vegetation is bunch-grass, sand-grass, and wild sage, are found upon actual experiment to contain great fertilizing elements, requiring nothing but irrigation to become first-class agricultural land. Among the most successful crops are winter wheat and barley, which ripen sufficiently early to escape the drought of the summer months; oats, corn, potatoes, and garden-fruits and vegetables. Thrifty orchards have been set out in several counties, producing abundant crops of apples, pears, peaches, and plums, and the grape-vine is said to thrive luxuriantly on the rich warm loam. The pastures are found to present very superior advantages for stock-raising and dairy-farming, the indigenous grasses being unexcelled in attractiveness to graminivorous animals, and in nutritive qualities. — *N.* has no national banks. In 1879 there were 18 State banks and private bankers, whose aggregate capital was $412,268. The State debt amounted to $540,400, the assessed value of taxable property was $28,024,610; and the tax per capita, $1.54. In 1870 *N.* had 627.46 m. of railroad in operation, as shown in the following table: —

Companies.	Total length of line.	Total length of line in *N.*
	Miles.	Miles.
Central Pacific	1,213 38	446.76
Eureka and Palisade (3 feet)	97.00	97.00
Lake Tahoe (3 feet)	8 75	8.75
Pioche and Bullionville (3 feet)	21.25	21.25
Virginia and Truckee	53.70	53.70

New Amsterdam. See GUIANA (BRITISH).

Newark. See NEW JERSEY.

Newark City Insurance Co., located in Newark, N. J., organized in 1860. *Statement*, Jan. 1., 1880: Cap. stock paid up in cash, $200,000; net surplus, $26,105.11; premiums, $125,793.56. Premiums received since the organization of the Co., $1,184,367.56; losses paid, $500,734.13; cash dividends paid to stockholders, $165,641.42.

Newark Fire-Insurance Co., located in Newark, N. J., organized in 1810. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $250,000; net surplus, $352,565.61; premiums, $196,280.62. Premiums received since the organization of the Co., 1,653,613.59; losses paid, $372,642.75, cash dividends paid to stockholders, $555,790.89.

New Bedford. See MASSACHUSETTS.

New Brunswick, a province of the Dominion of Canada. See ST. JOHN.

New Caledonia, an island of Australasia, belonging to France, which has been a general colony. It is situated in the S. Pacific Ocean, between lat. 20° and 22° 30′ S., lon. 164° 5′ and 167° E.; area, 6,769 sq. m. It is surrounded on all sides by coral-reefs, connecting numerous islets, rocks, and banks of sand, rendering the navigation intricate and dangerous. There are, however, two secure harbors, at Port Balade on the N. E., and Port St. Vincent on the S. E., of the island. The interior is in great part occupied by barren mountains; but there are also some very fertile valleys. Coal, nickel, iron, and copper are profitably worked. The recent discovery of gold at the N end of the island is attracting a number of Australian and Californian diggers. Numea, the seat of the government, is on Numea bay, near the S. W. extremity of the island. Pop. 70,000.

Newcastle-upon-Tyne. See GREAT BRITAIN (SEAPORTS).

New Chwang. See CHINA.

New England, the N. E. region of the U. States, comprising the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It extends from lat. 41° to 48° N., lon. 67° to 74° E. It has a coast-line of about 700 m.

New England Mutual Life-Insurance Co., located in Boston, Mass., organized in 1843. *Statement*, Jan. 1, 1880: Assets, $15,112,361.78; liabilities, $12,358,172.56; gross surplus, $2,754,149.18; policies in force, 18,750, amounting to $55,040.88; premiums, $1,558,844.69; dividends paid to policy holders, $496,840.85.

Newfoundland [Fr. *Terre-Neuve;* Ger. *Neu-Foundland*], a large island of N. America, lying on the N. E. side of the Gulf of St. Lawrence, between lat. 46° 40′ and 51° 39′ N., lon. 52° 44′ and 59° 31′ W. It is bounded E. by the Atlantic Ocean, N. W. and N. by the Strait of Belle Isle, which separates it from Labrador, W. by the Gulf of St. Lawrence, and on the S. W. it approaches at Cape Ray towards Cape Breton, so as to form the main entrance from the Atlantic into the St Lawrence. Extreme length about 420 m., and extreme breadth about 300 m. Capital, St. John's. Newfoundland, together with the coast of Labrador (see LABRADOR), forms an English colony, administered by a Governor, assisted by a responsible Executive Council, a Legislative Council of 15 members nominated by the Crown, and a House of Assembly of 31 members elected by the people. Pop. 161,389.

The island is of a somewhat triangular form, but without any approach to regularity, each of its sides being broken into numerous bays, harbors, creeks, and estuaries Its perimeter is not less than 1,000 m. From the sea it has a wild and sterile appearance, and its general character is that of a rugged, and, for the most part, a barren country. Hills and valleys continually succeed each other, the former never rising into mountains, and the latter rarely expanding into plains. Of various character, the hills sometimes form long, flat-topped ridges, and are occasionally rounded and isolated, with sharp peaks and craggy precipices. The valleys vary also from gently sloping depressions to rugged and abrupt ravines. The sea-cliffs are bold and lofty, with deep water to their bases; and the rough character of the country is increased by the existence of vast boulders scattered over it. The whole circuit of the island is full of bays and harbors, so spacious and sheltered on all sides by the mountains, except their entrance, that vessels lie in perfect security. The climate, being insular, is not liable to so great changes in temperature as that of the neighboring continental provinces of the Dominion of Canada, the winter being much milder and the summer not nearly so warm. The soil being ill adapted to agricultural purposes, kitchen vegetables are the principal crops. Timber is scarce, and the chief resources of the population are in the cod, seal, and salmon fisheries. The fisheries are of two kinds, the "Shore Fishery," which comprises the shores and bays of the island, and is carried on by the native fishermen; and the "Bank Fishery," which is almost exclusively in the hands of foreigners, principally French. The famous Grand Banks, which swarm with cod and other fish, form the most extensive submarine elevation on the face of the globe, being over 600 m. in length and 200 m. in breadth, with a depth of water varying from 10 to 160 fathoms. The cod fishery, which is the chief occupation of the inhabitants of the island, opens in June and lasts till the middle of November. The seal fishery is next in importance, employing many sailing vessels and steamers. The trade of *N.* is chiefly with Great Britain, the U. States, and Canada, the imports consisting of all articles used for food and clothing, as well as for domestic purposes. For the year 1879 our exports to *N.* and Labrador amounted to $1,209,513, and our imports from that colony to $413,783. See SEA-FISHERIES.

St. John's, the capital of *N.*, and the most eastern seaport of America, is situated near the E. extremity of the island, in lat. 47° 33′ 6″ N., lon. 52° 3′ W., 1,655 m. W. by S. of Galway, Ireland. Its harbor, which is excellent, has 12 fathoms of water in mid-channel, but only one vessel can pass at a time. Within there is ample space for shipping in good anchorage with perfect shelter. Its principal trade is in supplying the fishermen with clothing, provisions, and fishing and hunting gear. Pop. 25,000.

New Hampshire, one of the New England States of the American Union, lying between lat.

42° 41′ and 45° 11′ N., lon. 70° 40′ and 72° 28′ W. It is bounded N. by the Canadian province of Quebec, E. by Maine and the Atlantic Ocean, S. by Massachusetts, and W. by Vermont; maximum breadth, 90 m.; length from N. to S., 168 m.; area, 9,280 sq. m. The State is divided into 10 counties. *Concord*, the capital, is situated on the River Merrimac, 18 m. N. of Manchester. It is connected with Boston, 73 m. distant, by the Concord Railroad, and is the S. terminus of the Boston, Concord, and Montreal Railroad. It has extensive manufactures of cotton and woollen goods, carriages, machinery, leather belting, wooden ware, organs, etc. Pop. 15,000. *Manchester*, the most populous city and principal commercial centre of *N. H.*, is also situated on the Merrimac River and Concord railroad, 59 m. N. of Boston. The river, which here falls 54 feet, affords great hydraulic power, which is employed in extensive manufactures of cotton and woollen goods. There are also manufactures of steam-engines, locomotives, linen goods, hosiery, paper, edge-tools, carriages, shoes, leather, soap, machinery, etc. It is the terminus of the Concord and Portsmouth, Manchester and Lawrence, and Manchester and North Weare railroads; pop. 28,000. The other cities of *N. H.* are Nashua (pop. 12,000), Dover (10,500), and Portsmouth (10,000). Total pop. of the State, about 340,000.

For about 30 m. from the seaboard the surface is generally level, diversified, however, with hills and valleys Beyond this limit the country assumes a character of entire hilliness, rising, in the N. part of the State, into the extensive range known as the White Mountains, with the outlying and detached groups of the Grand Monadnock and Kearsarge. The culminating peak of this range is Mt. Washington, at an altitude of 6,285 feet above sea-level; being the highest summit in New England. With the exception of the strip of level land selvaging the seaboard, the whole State is mountainous and rugged, possessing, however, many fine valleys near the river courses. The coast-line extends for about 18 m only, and the shore is, in most parts, a sandy beach fringed with salt marshes. Portsmouth, at the mouth of the Piscataqua, forms the only eligible harbor for large ships, although there are numerous small coves or creeks suitable to the reception of small craft. The general slope of *N. H.* is from N to S, and the principal rivers are, tho Connecticut, which, rising near the N. frontier, forms nearly the whole W. boundary, and has for its affluents the Upper and Lower Ammonoosuc and the Ashuelot; the Merrimac and its parent streams; Salmon Falls River and the Piscataqua; the Cocheco, Margallaway, etc. About 110,000 acres of the area of this State present a water-surface; the chief lakes are those of Winnipiseogee, Umbagog, Sunapee, Squam, etc. The geological formations of the State are almost wholly those of the ancient metamorphic rocks, the mica and talcose slates, quartz rock, granular limestone, granite, gneiss, etc. Though these strata contain numerous metallic ores, they have not, as yet, assumed any developable degree of importance. Large beds of magnetic and specular iron-ores exist, but have been, hitherto, only partially worked. Copper, zinc, and lead ores — most of the latter silver-bearing — are found in various parts of the State. A lead-mine, largely argentiferous and containing also a large proportion of copper, is successfully worked at Warren; and gold is mined from the quartz in Lisbon, where are the quartz-mines. Beryls, tourmalines, and mica are found in large sizes and of superior quality. Sulphuret of molybdenum, graphite, or plumbago, and stearite or soapstone, are also met with. Fine building-granite is extensively quarried at Concord, Plymouth, etc. — The soil of *N. H.*, naturally infertile, has been to a great degree improved by industry and art. The N. part of the State is principally pasture and woodland. The best soils lie in the valleys of the rivers, some of which are subject to annual inundations The natural productions include the oak, pine, hemlock, ash, beech, birch, and other large timber, which supply a large annual export of lumber. The sugar-maple and the pitch-pine exist in plenty.

Fig. 366.—Seal of New Hampshire.

— The climatic tendency of *N. H.* is to severity, the temperature being a trifle colder than that of Maine, but more equable. Difference of elevation within the State, however, causes a corresponding difference in the scale of temperature; so much, indeed, as from 20 to 25 degrees between the valleys and the more elevated localities. In the summer solstice the thermometer sometimes ascends to as high as 100° F, while in winter the cold has been known to freeze mercury. In the region of the White Mountains the winters are excessively cold, and the peaks are covered, more or less, with snow three fourths of the year, — from which circumstance they have derived their distinguishing appellation. Taken altogether, the climate may be said to be highly salubrious, and cases of remarkable longevity are frequent. The cold season begins about the middle of Sept., and continues until May; and from the close of Nov. till the opening of spring the whole surface is thickly covered with snow, and the rivers are all ice-bound. — The soil, except in the fertile valleys, is better adapted to pasturage than to agriculture. The chief cereal products are maize, rye, and oats; the hardier kinds of fruits thrive well, and vegetable stuffs are raised in ample abundance. The relative value of agricultural products for the year 1879 is given in this work under the names of each of the principal crops. According to the last census, the total number of acres of land in farms was 3,605,994; of which 2,334,487 consisted of improved lands, 1,047,090 of woodland, and 224,417 of other unimproved soil; the cash value of farms under cultivation, $80,589,313; exclusive of $3,459,943 of implements and machinery: amount of wages paid for husbandry during the year, $2,319,164; total value of farm products, $22,473,547; of orchard stuffs, $743,552; of market-gardens, $119,997; of lumber, $1,743,944. The number of farms in the State was 29,642. — *N. H.* is a very important manufacturing State, and is especially noted for the extent of its textile industries. Other important industries are those of boots and shoes, machinery, and other iron and metallic wares. In 1879 *N. H.* had 43 national banks, with a paid-in capital of $5,365,000. The State debt amounted to $3,420,100; the total valuation of taxable property was $206,959,017, and the tax per capita, $1.04. There were in the same year 1,009 m. of railroad in operation, belonging to 33 corporations named in the following statement: —

Companies.	Total length of line.	Total length of line in N. H.
	Miles.	Miles.
Ashuelot	23.85	23.50
Atlantic and St. Lawrence	149.50	52 00
Boston, Concord, and Montreal	166.56	166.56
Boston and Maine	126.50	37.50
Brown Lumber	12.00	12.00
Cheshire	53.62	42.81
Concord	42.00	42.00
Concord and Claremont	71.00	71 00
Concord and Portsmouth	40.50	40.50
Dover and Winnipiseogee	29.00	29.00
Eastern	15.90	15.90
Fitchburg	93.32	9 37
Manchester and Keene	30.00	30.00
Manchester and Lawrence	22.39	22.39
Manchester and North Weare	19.00	19.00
Monadnock	15.80	13.76
Mount Washington	3.00	3.00
Nashua, Acton, and Boston	20.21	4.75
Nashua and Lowell	14.50	5.25
Nashua and Rochester	48 81	48 81
Northern	82.91	82.91
Peterborough	10 50	10 50
Peterborough and Hillsborough	18.50	18.50
Portland and Ogdensburg	94.00	43 00
Portland and Rochester	52.50	3.10
Portsmouth and Dover	10.88	10.88
Portsmouth, Great Falls, and Conway	71.37	68.82
Sullivan	26 00	26 00
Suncook Valley	20.00	20 00
West Amesbury	4.50	2 25
Wilton	15 50	15.50
Wolfeborough	12 03	12.03
Worcester and Nashua	45 69	6.63

Portsmouth, the only seaport of *N. H.*, is situated on the S. side of the Piscataqua River, on a peninsula 3 m. from the sea. The harbor, which can accommodate 2,000 vessels, is one of the best in the world; it has 42 feet water at low tide through the whole channel, and the current is sufficient to prevent it from freezing. The U States Navy-Yard is located on an island near the main bank of the river. The leading articles of manufacture are cotton cloth, hosiery, iron castings, shoes, etc. Portsmouth contains 4 national banks and 2 savings-banks; its commerce is less extensive than it was formerly, but it is still the centre of an important trade. Most of the foreign trade of *N. H* being carried through Boston, the imports and exports at Portsmouth are unimportant, but it has a consider-

able coastwise trade. In 1879, 1,067 vessels of 119,355 tons entered, and 1,033 of 120,527 tons cleared the port in the coastwise trade. There were belonging to the port 77 vessels of 10,823 tons. Pop. 10,000.

New Hampshire Fire-Insurance Co., located in Manchester, N. H., organized in 1870. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $250,000; net surplus, $147,133.04; premiums, $206,515.72. Premiums received since the organization of the Co., $1,289,672.95; losses paid, $643,602.90; cash dividends paid to stockholders, $144,000.

New Haven, a port of entry and the largest city of the State of Connecticut, is situated in lat. 41° 18′ 23″ N., lon. 72° 56′ 30″ W., at the head of New Haven Bay, 4 m. above its entrance into Long Island Sound, 74 m. E. N. E. of New York, and 36 m. W S. W. of Hartford. The harbor is shallow, and the main channel from the junction of Quinepiac and Mill Rivers is not deep enough for large vessels, but it will be much improved when the works now progressing are completed. New Haven is a commercial city of considerable importance. Its manufactures of clocks, carriages, india-rubber goods, and light iron-works are very extensive, and it produces besides fire-arms, cutlery, musical instruments, jewelry, needles, etc. New Haven has a large intercourse with the West Indies, and its commerce with Europe is fast growing. In 1879, 80 vessels of 16,824 tons entered, and 34 vessels of 8,906 tons cleared, the port, in the foreign trade. The foreign exports, chiefly consisting of fire-arms, cartridges, shots, machinery, etc., amounted to $3,248,754; and the foreign imports to $673,941. These figures do not by far represent the totality of the foreign trade of this city, much of the business of the New Haven merchants being done through New York. In the coastwise trade, 830 vessels of 563,858 tons entered, and 763 vessels of 560,971 tons cleared, the port in 1879. There were 194 vessels of 24,183 tons belonging to the district. New Haven has 9 banks of deposit, a trust company, 3 savings-banks, and 2 insurance companies. It is the seat of the celebrated Yale College. It has daily communication with New York by steamboats, and 5 lines of railroad place it in communication with all parts of the country. Pop. 65,000.

New Haven and Northampton R.R. runs from New Haven, Conn., to Williamsburg, Mass., 83.88 m.; branches, 16.03 m.; line leased, Holyoke and Westfield R.R., 10.32 m.; total length of road operated, 109.33 m. This Co., chartered in 1848, has its principal office in New Haven. Capital stock, $2,460,000; funded debt, $2,181,000. Cost of construction of road and equipment, $4,802,797.

New Jersey, a N. E. State of the American Union, lying between lat. 38° 55′ and 41° 24′ N., lon. 73° 59′ and 75° 29′ W. It is bounded N. by New York, E. by the Hudson River, New York Bay, and the Atlantic Ocean, S. and S. W. by the Delaware Bay, and W. by Pennsylvania; extreme length N. and S., 167 m.; maximum breadth, 58 m.; area, 8,320 sq. m.; length of coast-line, 120 m., or, including bays, 540 m. The State is divided into 21 counties. *Trenton*, the capital, is situated in lat. 40° 14′ N., lon. 74° 46′ 30″ W., at the confluence of Assunpink Creek with the Delaware River, at the head of steamboat navigation, 28 m. N. E. of Philadelphia, and 55 m. S. W. of New York by the Pennsylvania Railroad. It is an important manufacturing place, but is chiefly known for its manufacture of crockery, which is more extensive than that of all other places in the country; pop. 30,000. The other cities, besides the ports noticed at end of this article, are Paterson (pop. 40,000), Elizabeth (23,000), Camden (22,000), New Brunswick (18,000), Orange (10,000), Bridgeton (7,500), Rahway (7,000), Burlington (6,500), Millville (6,500), Plainfield (5,500), Harrison (5,500), and Salem (5,000). Total pop. of the State, about 1,350,000.

N. J occupies a portion of the great Atlantic slope of the U States, and partakes to some extent of the physical characteristics which belong to the whole region The Appalachian chain, with its broad belt or series of ridges, laps over with the N. and N W of the State, and gives to it form and character The belt of red sandstone, with its trap ridges, which is so prominent a feature in all the States from Massachusetts to South Carolina, gives character to the central section, while the comparatively level border, with its sandy soil and forests of pine, which fringes the Atlantic seaboard from New York to Florida, covers all the lower half of the State. The offsets of the Appalachian range in *N J* may be grouped in two main ranges,—the Blue or Kittatinny Mountains, and the Highland Range. The former, known in New York State as the Shawangunk, and in Pennsylvania as the Kittatinny Mountains, forms an almost unbroken ridge from the New York State line to the Delaware Water Gap, a distance of 40 m It is the highest ground in the State, being at the Water Gap 1,497 ft. above sea-level. Towards the N. W., the Kittatinny slopes off very gently, and rises again to lower but still considerable elevations in one or several parallel but subordinate ranges Nearly the entire surface of these is rocky and wooded, though the underlying rock, being a red sandstone or shale, is subject to disintegration, and in some places is covered with tillable soil Unlike the Kittatinny Mountains, the Highland Range is composed of a great number of hilly ridges; and while it occupies a belt of country 22 m wide on the New York State line, and 10 m wide on the Delaware, it really includes no long, unbroken ridges, except the Green Pond; and the subordinate ridges by which it is configured are not really in line with each other, nor are their axes parallel to the direction of the main range, but are somewhat oblique to it, so that if the direction of the range is N. E., that of these ridges would be about N. N E. The effect of this peculiar arrangement is to make it possible to cross from one side of the range to the other in a N. N. E. direction, without surmounting any considerable elevation, while it is impossible to cross it from S E. to N. W. without rising over a succession of steep and high mountain ridges. The Sparta, the Ringwood, the Rockaway, and many other valleys owe their form and direction to this remarkable feature of these ridges. The crests of the other mountain groups in the State, too numerous to enumerate, vary greatly in their surfaces, though all are much smoother and more rounded in outline than the Kittatinny Mountain or the trap ridges of the red sandstone. Many of them are covered so deeply with earth or decayed rock that they are susceptible of cultivation to their summits even, while others are covered with stony débris or bare rock, and can be only left in wood. The mineral wealth of this mountain region early attracted the attention of settlers, and the working of iron-mines was begun about the year 1700, but the hills, bad roads, and more or less stony surface, joined to the quicker returns of mining, have discouraged agriculture. There are, however, large districts in which the rocks disintegrated rapidly, and which now exhibit a rich and productive soil. The mountains near the Delaware, along the New Jersey Central Railroad, a large tract between Morristown and Dover, and the country about Mendham and Chester, are of this character. The red-sandstone region of the State is traversed by various and irregularly distributed ridges of trap-rock. These rough, rocky, and arboraceous ridges are remarkable from their occurrence in the midst of a rich, highly cultivated, and productive agricultural territory. The principal of these elevations are Sourland, Round Valley, and Palisade Mountains, Rocky and Bergen Hills, etc. They are rough in configuration, very steep in their descent toward the S. E., and easy in their slope toward the N. W. The S. division of the State is characterized by the absence of any rocky eminences, or any elevations worthy the name of mountains. Its circular hills are all earthy, and are results of denudation or erosion. The Navesink Highlands, on which the Navesink light-houses are located, and which are the first points of land sighted when entering New York harbor from sea, are about 400 feet high, and exhibit the highest altitude found in this portion of *N J.* The Delaware Valley, striking both sides of the Delaware River in its course from Carpenter's Point to the Water Gap, a distance of about 40 m., runs nearly parallel to the base of Kittatinny Mountain. This valley, from half a mile to three miles

Fig. 367 — Seal of New Jersey.

in width, contains limestone and much good land, affording abundant crops to its owners, and presents a variety of picturesque scenery. The belt of country lying between the Kittatinny and Highland ranges is known as the *Kittatinny Valley.* It is a part of that great Appalachian basin of the U. States which extends from Canada to Tennessee, and which is everywhere known for its fine scenery and agricultural wealth. In *N. J.*, it has a length of 39 m., with an average width of 10 m. Its surface is variegated in the direction of its length by short eminences of slate and limestone. These ridges are of slight elevation, covered with soil, and present throughout the summer the richest verdure. Between the subordinate ranges of the Highlands valleys of various extent are found, adding beauty to the scenery and importance to husbandry. German Valley, on the S. Fork of the Rapidan, is almost enclosed by mountains. Succasunny Plains, at the head-waters of the same river, lie between the hills at an altitude of 755 ft. above high-water mark. Toward the N. E. they open into Berkshire and Longwood Valleys. Some of the vales of the Rockaway and its feeders, which nestle among rugged and wooded hills, are perfectly charming in their picturesqueness. The Valley of the Passaic, which is almost enclosed by the Highlands on the one side, and by the trap-ridges of the First, Second, and Third Mountains on the other sides, is on the S. E. edge from 160 to 180 ft. above tide-level, while along its N. W. border and along the Morris Plains it rises to 400 ft. The fine valley extending from the N. Y. line almost to the Raritan, and having the First Mountain on the N. W., and the Palisades and Bergen Hill on the S. E., is another feature of the red-sandstone plain. Some portions of its surface attain the height of from 150 to 200 ft., as at Orange and Scotch Plains, while the tide flows for a long distance across it in the Hackensack and Passaic The S. E. selvage of this plain is the least elevated of any land in the centre line of the State. The Delaware and Raritan Canal crosses the State here without any deep cuttings, and with a summit level only 57 ft. above mean tides. The S. half of the State is low, level, sandy, and in many parts barren. It may be described as a great plain, which slopes gently from its centre towards the Atlantic Ocean and the Delaware, and which has been eroded in the Drift Period, so as to leave bossy hillocks of a few feet in height, and also been furrowed by the streams which give it drainage. A great part of the E. shore is fringed with a chain of low islands, similar to those on the coasts of the more S. maritime States, but with more numerous, larger, and deeper inlets between them Great and Little Egg Harbors, Barnegat, Delaware, Newark, and Sandy Hook Bays, Shark Inlet, and the united bays of Navesink and Shrewsbury, afford shelter to vessels of considerable burden. The tide-marshes form a noticeable feature of the country bordering the ocean and the tidal waters of *N. J.* They are usually grassed and sodded, and their upper surface is near high-water level. They are usually of soft mud underlying the sod, and frequently so boggy that horses or cattle cannot pass over them. This substratum of mud varies from 6 inches to 30 ft. in depth, and is underlaid, in its turn, by firm, gravelly, or sandy soil. These marshes are capable of reclamation, and it is stated that of the 295,474 acres which form their area, some 26,000 acres have already been brought into an improved and cultivable condition, and are utilizable as land. Within the area of the State there are of these morass-lands 295,474 acres. — The principal rivers of the State are the Delaware, separating it from Pennsylvania, and receiving quite a number of affluents; and the Passaic, Hackensack, Raritan, Rahway, Navesink, Shrewsbury, Tonis, and Little and Great Egg Harbor Rivers, all emptying into the Atlantic. In the N. W. part of the State there are several small but pleasantly situated lakes. — The climatic difference between the N. and S. parts of the State is very striking. The plain country of the S. is warmer than might have been expected from the lat., the temperature approximating to that of E. Virginia, and admitting of the partial culture of cotton; while the winter in the N. assimilates in severity to that of the N. States. The melons, sweet potatoes, and other semi-tropical products, which are raised in perfection in the S. and middle cos., and are scarcely attempted in the extreme N. ones, owe their excellence to a mean summer temperature not more than three or four degrees higher than is observed in the N. part of the State. Fevers and ague prevail in the neighborhood of the marshes; but upon the seaboard, and in the hilly regions, the climate is in the highest degree healthful and invigorating. — The State is separated into 5 distinct geological divisions, each of which is clearly defined by its peculiar formations, mineral products, and soils. These represent the azoic, paleozoic, triassic or red sandstone, cretaceous, and tertiary and recent formations. Of the azoic, the Highland range of mountains forms the extent, and, with the paleozoic, includes the iron-ore and limestone districts. The triassic formation occupies the belt of country which crosses the State from N. E. to S. W., adjoining the Highland range on the S. E., and comprises the red sandstone and trap-rocks. The cretaceous is found immediately S. E. of the red sandstone, in a long and narrow strip reaching from Raritan and Sandy Hook Bays to the head of Delaware Bay, near Salem. In this formation is included the green sand marl-beds. Lastly come the tertiary and recent formations, which are almost entirely limited to the S. part of the State, covering Atlantic, Cumberland, and Cape May Cos., and the greater part of Ocean Co. The superficial character of this region is that of a sandy plain covered with forests of pitch-pine and oak, and cedar swamps. Extensive deposits of bog-iron ores are found here. Calcareous marls of the miocene period are found in the W. part of Cumberland Co., and from the N. outcrop of this formation, which further extends S and furnishes immense quantities of shelly débris for manure. In the same county a plentiful supply of suitable sand is extensively made available in the glass manufacture carried on at Millville and other places. The cretaceous formation, known as the *green sand* or *marl dist.*, forms the upper secondary group of alternating sands and clays, in which, setting aside a few instances of a brown sandstone, and of a yellowish limestone (enclosing shelly and coralline remains), the mineral beds wholly consist of loose, unconsolidated materials. Numerous deposits of green sand are dispersed throughout this dist., and contribute much to its fertility; and it contains some of the best farming lands in the State. In this district, too, are found extensive beds of plastic clay, largely worked near Amboy, and at other localities for the making of fire-brick. The great belt of metamorphic rocks of the triassic formation extends from Trenton toward the outcrop of the margin on the N. side of Staten Island, and along New York Island; on the other hand, the same group stretches out toward the Pennsylvania frontier. From the N. W. of the State to the border of the green sand formation, the metamorphic group is overlaid and hidden by the red sandstone of the middle secondary. The strata of argillaceous red sandstone forming the base of this formation dip smoothly toward the N., and describe a basin of 20 m. wide, extending from the Hudson River near the Highlands S. W. through the middle Atlantic States. This is the territory of the red rocks and red sandy soil of the State, whose surface presents a series of moderate undulations, checkered by numerous abrupt and rugged eminences, and long, narrow ridges, with very steep and rocky declivities composed of greenstone trap. The longest of these ridges fringes the W. bank of the Hudson River, and forms the Palisades, finally terminating to the back of Jersey City in New York Bay. The *N. J.* copper ores occur near the line of demarcation of the sandstone with these greenstone ridges. The metamorphic group occupies the Highlands, developing gneissic rocks from the Ramapo to Pochuck Mountain, where the lower silurian limestone crops out in the valleys stretching S. W. between the parallel ridges of gneiss and metamorphic slates. Toward the S. and W. the limestones run in continuous parallels with the valleys across this section of the State. In this region occur valuable and extensive beds of magnetic and specular iron ores, which yield abundant supplies of raw material to the great iron-manufacturing concerns of the State. In the limestone at Franklin, near its point of association with the gneiss, beds of red oxide of zinc, in combination with franklinite, are met with. This tract is on the W. boundary of the metalliferous region, or, in other words, may be defined by a line reaching from Pochuck Mountain to Belvidere on the Delaware. Lastly succeed the formations pertaining to the lower section of the Appalachian system of rocks. The lower silurian limestones make gradual way to a belt of the Hudson River slates, extending as far W. as the Delaware Water Gap, to the foot of a high ridge of coarse white sandstone, the course of the Shawangunk Mountain and of its characteristic grit rock advancing in a ridge, almost without a break, from near Rondout on the Hudson across the N W. selvage of the State into Pennsylvania. Sections of the soil of the great plain of the S. and central divisions of the State are not normally fertile; but since the application of marls and other fertilizing substances thereto, the soil has been rendered very productive. In some tracts, however, as those near the seaboard, the soil is of a white, sandy nature, and is not susceptible of any high degree of melioration; nevertheless, even on the coast some arable lands are met with, such as the beaches at Deal and Long Branch, which may be said to be the sole fertile patches immediately on the Atlantic from the extreme N. E. to the S. limit of the U. States coast-line. The N. portion of the State is admirably suited to agriculture and grazing. Excellent pasture-lands are also found among the mountain valleys, while the alluvial bottoms are pre-eminently productive. The central division of *N. J.* is the most thoroughly developed region of the State, and may be described as an immense market-garden, whose produce supplies, in great part, the demands of the cities of Philadelphia and New York. The apples and cider of this part of the country have deservedly won a high reputation, as also have the peaches and other semi-tropical fruits and vegetables of the more S. districts. The vegetation is not characterized by any distinctive features, it corresponding with that of the Middle States generally. The oak, hickory, and other forest timber grow to a sizable extent in the N. part, while the S. contributes valuable pine and cedar woods, together with an abundant yield of stunted oak, which derives importance as an article of fuel. Maize, wheat, and the other cereals (excepting a limited product of barley), with the usual hardier fruits and vegetables, are raised in ample quantities; dairy-produce, beeswax, and honey are in good supply; and there is also a tolerably fair product of wine, tobacco, silk, hops, and maple-sugar. The relative value of agricultural

products for the year 1879 is given in this work under the names of each of the principal crops. — The number of farms in *N. J.*, according to the last census, was 30,652; total number of acres of land in farms, 2,989,511; of which 1,976,474 consisted of improved lands, 718,335 of woodland, and 294,702 of other unimproved soil; the cash value of farms under cultivation, $257,523,376, exclusive of $7,887,991 of implements and machinery: amount of wages paid for husbandry during the year, $8,314,548; total value of farm products, $42,725,198; of orchard stuffs, $1,295,282; of market-gardens, $2,978,250; of lumber, etc., $352,704. — Owing to its proximity to New York and Philadelphia, its abundant water-power, and its unlimited facilities of communication with all parts of the country by sea, rivers, canals, and railroads, *N. J.* stands in the first rank among our manufacturing States. Among its leading articles of manufacture are pottery, silks, india-rubber goods, steel, trunks, jewelry, hats, celluloid goods, boots and shoes, carriages, carpets, cotton and woollen goods, leathern goods, iron, machinery, lumber, paints, saddlery, tiles, tinware, etc. The oyster and shad fisheries are of sufficient consequence to influence an extensive trade. — In 1879 *N. J.* had 69 national banks, with a paid-in capital of $13,858,350; there were, besides, 59 State banks, savings-banks, and private bankers, whose aggregate capital was $1,741,071, and deposits, $19,326,498. The total debt of the State was $2,196,300; the personal property was valued at $127,236,220, real estate, $404,615,629; total, $531,851,849. Rate of tax, 2.5 mills to the dollar; tax per capita, $1.02. — The principal canals of *N. J.* are the Morris Canal, which extends from Jersey City to Phillipsburg, 101 m.; and the Delaware and Raritan, which connects Trenton with New Brunswick, and is, with its feeder, 65 m. long. In 1879 *N. J* had 1,663 m. of railroad in operation, belonging to 68 corporations, as exhibited in the following statement: —

Companies.	Total length of line.	Total length of line in State.
Belvidere Delaware	68.83	68.83
Blairstown	11.50	11.50
Camden and Atlantic	67.00	67.00
Camden and Burlington County	29.60	29.60
Camden, Gloucester, and Mount Ephraim	5.97	5.97
Cape May and Millville	41.58	41.58
Central of New Jersey	100.77	100 77
Charlotteburg and Green Lake	4.50	4.50
Chester	10.00	10 00
Columbus, Kinkora, and Springfield	14.37	14.37
Cumberland and Maurice River	20.30	20.30
Delaware and Bound Brook	30.70	30.70
Delaware Shore	20.00	20 00
Eastern and Amboy	60.00	60.00
Farmingdale and Squan Village	8.60	8 60
Ferro Monte	2.50	2.50
Flemington	11.67	11.67
Freehold and Jamesburg Agricultural	11.45	11.45
Freehold and New York	12.63	12.63
Hibernia Mine	5.50	5.50
High Bridge	17.32	17.32
Hudson Connecting	5.50	5.50
Jersey City and Albany	24.00	23.00
Jersey City and Bergen	6.00	6.00
Long Branch and Sea-Girt	3.40	3.40
Long Dock	2 49	2.49
Longwood Valley	13 26	13.26
Mercer and Somerset	22.54	22.54
Millstone and New Brunswick	6.61	6.61
Morris and Essex	120.56	120.56
Mount Holly, Lumberton, and Medford	6.18	6.18
Mount Hope Mineral	4.25	4.25
Newark and Bloomfield	4.25	4.25
Newark and Hudson	5.62	5.62
New Egypt and Farmingdale	7.42	7.42
New Jersey Midland	71.00	71.00
New Jersey and New York	36.50	18.00
New Jersey Southern	108.15	108.15
New York and Fort Lee	3 36	3.36
New York and Greenwood Lake	41 50	41 50
New York and Long Branch	23.35	23 35
Northern	21 25	21 25
Ogden Mine	10.00	10.00
Passaic and Delaware	15.00	15.00
Paterson and Hudson	14.97	14.97
Paterson, Newark, and New York	10.91	10.91
Paterson and Ramapo	15.13	15.13
Pemberton and Hightstown	25.40	25.40
Pemberton and New York	18.25	18.25
Perth Amboy and Woodbridge	6.30	6.30
Philadelphia and Atlantic City	54.67	54.67
Rocky Hill	2.33	2.33
Salem	16 58	16 58
South Branch	15.80	15.80
Squankum and Freehold	7.65	7.65
Sussex	34.00	34.00
Swedesboro'	10 80	10 80
Trenton Delaware Bridge	0 19	0.19
Tuckerton	31.00	31 00
United of New Jersey	172.89	155.60
Vincenttown	2.84	2.84
Vineland	47 50	47.50
Warren	18.50	18.50
Watchung	4.00	4.00
Weehawken Branch	3.72	3.72
West End	1.63	1.63
West Jersey	59.49	59.49
Williamstown	9.50	9 50

The principal ports of *N. J.*, here given in their alphabetical order, are mostly interested in coastwise traffic only. Jersey City, possessing a large and direct foreign trade, is included in the collective district of New York, while the commerce of the S. part of the State is generally transacted through Philadelphia.

Bridgeton, a city, port of entry, and capital of Cumberland Co., is on both sides of Cohansey Creek, 20 m from its entrance into Delaware Bay, 40 m. S of Philadelphia, with which it is connected by the West Jersey railroad. It has several important manufactories, and carries on a large coasting trade. In 1879, 7 vessels of 1,153 tons were built in Bridgeton; the total number of vessels belonging to the port was 313, having an aggregate tonnage of 15,688. Pop. 7,000.

Burlington, a city and port of entry, in Burlington Co., on the Delaware, in lat. 40° 5′ N, lon. 73° 10′ W., 18 m. N. E. of Philadelphia. Though it has greatly declined with the rise of Philadelphia, Burlington still maintains a respectable shipping trade.

Hoboken, a city of Hudson Co., on the W. bank of the Hudson River, opposite New York, with which it is connected by 2 steam-ferries, immediately above Jersey City, with which it is connected by horse-cars. Hoboken forms part of the customs district of New York; its river frontage, which is only about ½ m., is mostly occupied by coal-docks, and the docks of 1 English and 2 German lines of European steamers which start from that port. Hoboken is one of the principal depots of coal from which New York and its shipping are supplied. It is the E. terminus of the Morris and Essex division of the Delaware, Lackawanna, and Western R.R. Pop. 22,000.

Jersey City, a flourishing city, and the capital of Hudson Co., at the mouth of the Hudson River, opposite New York City. Though a separate municipality, and belonging to a different State, it may be considered as a suburb of the great metropolis, with which it is connected by several ferries. It is a place of considerable manufacturing industry, ship-building, and commerce. It forms part of the New York customs district, and its foreign commerce is not reported separately. It is the American station of the Cunard line of New York and Liverpool steamers, and is the terminus of the Morris Canal. It is also the terminus of 11 lines of railroad. Jersey City has 3 national banks, 2 State banks, 8 savings-banks, 1 trust company, and 4 insurance companies. Pop. 100,000.

Newark, a port of entry, the capital of Essex Co., and the largest city in the State, is situated on the Passaic River, about 4 m. from its entrance into Newark Bay, and 9 m. from New York, in lat. 40° 45′ N., lon. 74° 10′ W. Newark has been long distinguished for the importance and variety of its manufactures, which embrace jewelry, saddlery and harness materials, felt and silk hats, patent leather and morocco, carriages, varnish, ale and lager beer, trunks and valises, chemicals, cotton thread, clothing, boots and shoes, agricultural implements, machinery, sewing silk, celluloid goods, etc.; also smelting and refining of gold, silver, and lead ores, etc. There are 11 banks, 5 savings-banks, 3 trust companies, 3 life and 16 fire insurance companies; the total capital and assets of the financial institutions amounting to about $70,000,000. Newark is connected with New York by 4 railroads. In 1879 the number of vessels belonging to the customs district was 71, of 6,899 tons. Pop. 125,000.

Perth Amboy, a port of entry of Middlesex Co., on Raritan Bay, at the mouth of Raritan River, and at the S. end of Staten Island Sound, or Kill van Kull, opposite Tottenville, with which it connects by steam ferry. It is 21 m. S. W. of New York, and about 3 m. N. of South Amboy. Its harbor is good, and easily accessible to large vessels. In 1879, 13 vessels of 6,041 tons entered, and 71 vessels of 20,511 tons cleared, the port in the foreign trade; 163 vessels of 31,615 tons entered, and 90 vessels of 18,527 tons cleared the port in the coastwise trade. There were 560 vessels of 48,484 tons registered, enrolled, or licensed in the customs district of Perth Amboy. Pop. 4,000.

New Jersey Midland R.R. runs from West End, N. J., to Unionville, N. Y., 71 m.; lines leased,

17 m.; total length of line operated, 88 m. This Co., located at Jersey City, was chartered in 1870, and the road was opened in 1872. It was placed in the hands of a receiver in 1875. Capital stock, $1,423,745.18; funded debt, $5,500,000; floating debt, $989,924.

Fig. 368 — NEW JERSEY TEA.

New Jersey Tea, the leaves of *Ceanothus Americanus* (Fig. 368), a shrub found in dry woods from Canada to Florida, which have been sometimes used as a substitute for tea. They have something of the taste of the lowest grades of the Chinese tea, but have no stimulating properties, and are readily distinguished from the true tea by being strongly three ribbed.

New London, a port of entry and city of New London Co., Conn., situated on the Thames River, 3 m. from its entrance into the ocean, 50 m. E. of New Haven, and 126 m. N. of New York; lat. 41° 22′ N., lon. 72° 9′ W. Its harbor, which is 3 m. long, 30 feet deep, and rarely obstructed by ice, is one of the best in the world, but is, however, seldom visited by foreign vessels. New London is the E terminus of the Shore Line Division of the New York, New Haven, and Hartford R.R., and connects also with New York by a daily line of steamboats. The whale fisheries constitute its main interest (see CONNECTICUT), and it has also a large coasting trade. In 1879 there were 208 vessels of 21,802 tons belonging to the port. Pop. 10,500.

New London Northern R.R. runs from New London, Conn., to Miller's Falls, Mass., 100 m. This Co., located in New London, was chartered in 1847 as the New London, Willimantic, and Springfield R.R. Co., and was reorganized under its present name in 1859. In 1871 the road was rented for 20 years to the Central Vermont R.R. Co., at a rental of $155,000 a year. Capital stock, $1,500,000; funded debt, $687,500. Cost of construction of road and equipment, $2,284,610.

New Mexico, a Territory of the U. States, lying between lat. 31° 20′ and 37° N., lon. 103° and 109° W. It is bounded N. by Colorado, E. by the Indian Territory and Texas, S. by Texas and Mexico, and W. by Arizona; extreme length, 390 m.; breadth, 335 m.; area, 121,201 sq. m. The Territory is divided into 13 counties. *Santa Fé*, the capital and largest town of *N. M.*, is situated in lat. 35° 41′ N., lon. 106° 10′ W., about 20 m. E. of the Rio Grande; it has 2 national banks, with a paid-in capital of $300,000; pop. 5,500. Pop. of the Territory, about 125,000.

N. M. is a mountainous country, with an extensive valley in the middle, running from N. to S., and formed by the Rio del Norte. The valley is generally about 20 m wide, and bordered on the E. and W. by mountain chains, continuations of the Rocky Mountains, which have received here different names, as Sierra Blanca, de los Organos, Oscura, on the eastern side, and Sierra de los Grullas, de los Mimbres, toward the W. The height of the mountains S. of Santa Fé is from 6,000 to 8,000 feet, while near Santa Fé, and in the more northern regions, some snow-covered peaks rise from 10,000 to 12,000 feet above the sea. The mountains are principally composed of igneous rocks, as granite, sienite, diorite, basalt, etc. The Rio Grande del Norte, the largest river of the Territory, takes its rise in the mountains of Colorado, and, after traversing the Territory in a longitudinal direction, forms the line of demarcation between Texas and Mexico, and finds its embouchure in the Mexican Gulf. The Rio Pecos drains the S. E. section of the Territory, and the Canadian, an affluent of the Arkansas, the N. E. part. W. of the Sierra Madre the country forms the water-shed of the Gila, Rio Puerco, and the San Juan, tributaries of the Colorado of the West. None of these streams are important for navigation, being seldom of depth sufficient for larger craft than canoes or scows. — There exists great diversity in the climate of *N. M.*; in the N. region, among the mountains, the winters are long and severe, but not so subject to sudden fluctuations of temperature as in more humid climates. The common annual range of the thermometer is from 10° to 75° F. Near El Paso, in the S. part of the Territory, the temperature is mild, rarely falling below the freezing-point. The sky is usually clear, and the atmosphere remarkably dry, the entire country being considered one of the healthiest regions in the Union. Maladies so common in the Mississippi Valley are almost unknown here, and pulmonary complaints are of rare occurrence. In the S part of the Territory the rainy season extends over July and August. — The table-lands, mountain slopes, and valleys are abundantly supplied with a variety of nutritious grasses, which, being cured by climatic action, afford excellent pasturage the year round. The most valuable and widely distributed of these is the "gamma" grass, or *mezquite*; its peculiar value consisting in its adaptation to all the requirements of an arid climate. The herdsmen and shepherds of *N M.*, being thus furnished with excellent pasturage during the winter months, have a great advantage over the farmer and stock-raiser of the N. and E. States, who are necessitated to expend a great portion of their time and labor in the production of provender to sustain their beasts during the winter season. The wide range afforded by the extensive grazing-lands of the Territory seems to have had a very cordial effect on the health of sheep and cattle, as diseases common to many localities are here almost unknown The beef and mutton are celebrated for their prime quality. All meats are cured without the use of salt, being jerked, Indian fashion, by exposure to the sun and air. Although a portion of the Territory is unsuited to cultivation, the river-bottoms, and even the table-lands, where irrigation is feasible, are exceedingly productive. In the valleys maize, wheat, barley, and oats yield ample crops, while apples, peaches, melons, apricots, and grapes are grown in great perfection. The grape is especially prolific, and the quality of the wine produced is excellent. In the S. division of *N M* many of the semi-tropical fruits thrive spontaneously. Owing to the necessity of irrigation, agricultural operations are principally confined to the valleys of the water-courses. In some localities the crops are occasionally curtailed by the failure of the streams in a long-continued drought. Where water is abundant, however, the crops are sure and remunerative, and the husbandman, regulating the supply of moisture himself, need never have his crops destroyed by freshets, and much less permit them to suffer from drought Forests of pine, cedar, spruce, and other kindred trees clothe the mountain ranges. On the foot-hills are found extensive tracts of piñon and cedar, while a variety of deciduous timbers skirt the margins of the streams, — cotton-wood and sycamore being the most abundant, — and in the S. districts groves of oak and walnut are met with. At the time of the last census the number of acres of land in farms was 833,549; of which 143,007 consisted of improved lands, 106,283 of woodland, and 584,259 of other unimproved soil. The number of farms was 4,480; cash value of farms under cultivation, $2,260,139, exclusive of $121,114 of implements and machinery; amount of wages paid for husbandry during the year, $523,888; total value of farm products, $1,905,060; of orchard stuffs, $13,609; of market-gardens, $64,132; of lumber, etc., $500. — *Minerals.* Veins of the precious metals, and rich deposits of copper, iron, and coal are found in many parts of the Territory, and new discoveries are constantly being made. The mining interests of the country are being rapidly developed, and the yield of gold and silver during 1868 presented a very favorable contrast with previous years. The most thoroughly explored regions where the precious metals have been found are the Old and New Placers, Pinos Altos, Cimarron mining district, Arroyo Hondo, Manzano, and Organ Mountains, Sierras Blanca, Carriga, and Jicarilla, and the Mogollon and Magdalena Mountains. In reference to these several mineral districts, the surveyor-general reports that the region called Old and New Placers, situated in Santa Fé and Bernalillo Cos.,

extends over about 200 sq. m. of territory, three fourths of which is embraced by the Cañon del Agna, Ortiz, and San Pedro private land-claims. In this district a great number of lodes of gold-bearing quartz have been discovered, the principal ones being the Ortiz, Ramirez, Mammoth, and Candelaria. A duct or canal 70 m in length is projected from the Pecos River to these mines, which will furnish an adequate supply of water throughout the year for the working of the mines, the full development of which will thus be secured, and doubtless a very large yield of gold obtained. The New Mexico Mining Company at the Placer de Dolores runs about 40 stamps, working on ore from the Ortiz, yielding from $12 to $15 per ton, and at the Placer de San Francisco a 10-stamp mill obtains $35 per ton from ore taken from the Santa Candelaria lode. In Grant Co., the Pinos Altos mining dist includes within its limits 200 sq m,

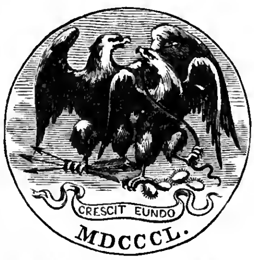

Fig. 369 — Seal of New Mexico.

and contains mines of gold, silver, and copper. The Pacific, Pacific No. 2, Arizona, Atlantic, Langston, and Aztec are the principal gold-mines The veins run from a few inches to 4 ft. in width, and in some of them the ore is exceedingly rich. Thirty lbs of quartz taken from the Langston lode in 1869 averaged $50 to the pound The silver ores in this district yield from $20 to $30 per ton. The copper-mines are formed in a feldspathic rock, about 2 m. in breadth and 20 m. in length. The Santa Rita mine, producing about 3,000 lbs. of copper per week, is the only one at present in operation The ore from the Stephenson mine in the Organ Mountains yields 80 per cent of lead, from each ton of which is extracted $50 worth of silver. In the Cimarron dist, embracing 400 sq. m., a ditch 37 m in length has been constructed, yielding a limited supply of water for the working of the gulch mines. 'In the Manzano Mountains, gold, silver, and copper mines are met with The Carson lode, which has been opened to a depth of 60 ft. furnishes from $60 to $1,200 in gold per ton of ore. In the Sierra Blanca a number of rich lodes have been discovered, which give promise of large yields when developed. For the year 1878 the bullion produced by the mines of *N. M.* amounted to $175,000 gold, and $500,000 silver. Veins of bituminous coal have been found cropping out in various places, and anthracite of a superior quality is met with about 20 m. S. of Santa Fé. Zinc, antimony, kaolin, and other minerals are also found. The first railroad within the Territory was the New Mexico and Southern R R., which runs from State line, Colorado, to Los Vegas, *N. M.*, 116 m, and was opened on July 1, 1879.

New Orleans (Fr. *La Nouvelle Orléans*), a port of entry, the capital of the State of Louisiana, and the commercial metropolis of the Gulf States, is situated on the Mississippi River, about 100 m. from its delta, 141 m. W. by S. of Mobile; 330 m. E. of Houston, Texas; about 700 m. by rail S. of St. Louis; and something over 1,600 m. S. W. of New York; lat. of custom-house, 29° 57′ 35″ N., lon. 90° 9′ W. It is a beautiful city, regularly built, except in its older portion, which extends itself on the convex side of a bend of the river, whence the familiar name of *Crescent City*, which name is now inappropriate, the successive growth of the city up stream, following the meanders of the river, having modified its outline, 11 or 12 m. in extent, almost to that of an S. The city now includes, on the left bank of the Mississippi, almost the whole of the parish of Orleans and the town of Carrollton; and on the right bank the towns of Algiers and Gretna. *N. O.* is the great cotton-market of the country, and the emporium of all the vast regions traversed by the Mississippi and its tributary streams. The unhealthiness of the climate is the great drawback of this city. During the months of July, August, September, and October the population is much reduced through fear of the yellow fever. Usually this dreadful sickness is almost exclusively caught by strangers and foreigners; but in some great epidemic years the yellow fever, seeming to assume a new character, has not spared the natives. It is, nevertheless, remarkable that this fever is not now so permanently dangerous as it was in the first half of this century, becoming epidemic only one or two times in ten years. The temperature of *N. O.* is rarely extreme, the average maximum for the year being 83.7° F., the average minimum 51.8°, and the general average, 67° to 68°. The surface of the river at high water is from 2 to 4 ft. above the level of the city; and even in its lowest stages it is above the level of the swamps in the rear. To obviate inundations, a *levée*, or embankment, from 5 to 30 ft. in height, has been raised for about 200 m. above and 50 m. below *N. O.* This levee, in front of the city, is extended by a continuous series of wooden wharves or piers, forming a kind of esplanade several miles in extent, which, during the busy season, present a scene of singular variety and animation. The depth of water in the river opposite *N. O.* is, as a medium, about 70 ft.; and it maintains soundings of 30 ft. till within a mile of its confluence with the sea. Besides three or four of inferior consequence, the Mississippi has four principal passes or outlets. In the south-east, or main pass, at Balize, the water on the bar, at ordinary tides, does not exceed 12 ft.; and as the rise of tides in the Gulf of Mexico is not more than 2 or 2½ ft., vessels drawing more water could not make their way from the sea to *N. O.* Recently, however, jetties have been made so successfully as to give 30 feet of water over the bar, and the larger steamers can now reach the city. There are numerous steamship lines running to Havana, Baltimore (*via* Havana and Key West), Philadelphia (*via* Havana), Florida, New York, Boston, Texas, Vera Cruz, Liverpool, Havre, Bremen, and Rio de Janeiro. There are, besides, three principal lines of railroad connecting *N. O.* with all parts of the country, N., W., and E. Pop. 225,000.

The customs district of which *N. O.* is the port of entry includes almost the entire valley of the Mississippi, with ports of delivery at Pittsburg, Wheeling, Louisville, Memphis, Nashville, St Louis, Cincinnati, Evansville, Galena, Cairo, Burlington, Dubuque, La Crosse, and Omaha. *N O*, therefore, commands the direct foreign commerce of an immense extent of country. New York, Boston, San Francisco, Philadelphia, and Baltimore surpass it in the value of imports; but it stands next to New York in the value of exports and of its entire foreign commerce. For the year 1879 the value of exports was $63,794,426; of imports, $7,220,597.

The following statement exhibits the quantity and value of the principal articles of export from *N. O.* during the year 1879: —

Articles of Export.	Quantity.	Value
Indian corn (bu.)	3,956,301	$1,701,971
Rye (bu.)	350,258	197,412
Wheat flour (bbl)	69,948	339,054
Raw cotton (bales)	1,249,639	55,847,922
Oil-cake (lbs.)	121,344,502	1,112,095
Cotton-seed oil (gal)	3,213,903	1,304,837
Tallow (lbs)	2,207,753	138,601
Tobacco leaf (lbs)	9,910,356	546,564
Shooks and staves	....	431,630

The exports of cotton and tobacco from the port of *N. O.* for the twenty years from 1860 to 1879 were as follows: —

Years.	Cotton.		Tobacco.	
	Pounds.	Dollars.	Pounds.	Dollars.
1860	922,766,397	96,166,118	....	7,434,909
1861	31,538,832	2,923,538	....	3,245,745
1862	....	....	....	....
1863	1,862,362	745,849	....	1,812,746
1864	2,192,455	1,614,268	....	62,720
1865	550,671	893,487	....	42,210

Years	Cotton.		Tobacco.	
	Pounds.	Dollars.	Pounds	Dollars
1866....	233,955,490	94,483,982	5,560,121	351,359
1867....	267,799,492	78,685,987	14,533,778	1,390,625
1868....	278,310,931	53,378,521	18,530,198	1,911,936
1869....	279,292,757	68,607,310	29,373,272	2,819,812
1870....	435,457,031	100,686,902	26,809,299	3,047,593
1871....	584,798,463	86,884,964	33,576,585	3,312,918
1872....	425,990,231	82,121,910	38,184,337	3,800,258
1873....	519,995,834	98,151,682	24,065,296	2,569,558
1874....	549,698,675	84,470,064	38,159,868	3,289,409
1875....	450,222,572	67,054,109	9,682,103	1,097,082
1876....	628,431,371	78,362,717	18,000,070	1,636,109
1877....	556,497,765	63,962,524	16,082,137	1,588,124
1878....	686,545,999	75,174,963	16,416,236	1,167,114
1879....	575,894,473	55,852,980	9,910,356	546,564

Estimated quantities of sugar and molasses produced in Louisiana and received at the port of N. O. during the 20 years from 1859 to 1878:—

Years.	Sugar.		Molasses.
	Hogsh'ds.	Pounds.	Gallons.
1859..................	362,296	414,796,000	24,887,760
1860..................	221,840	255,115,750	17,858,100
1861..................	228,753	265,063,000	18,414,550
1862..................	459,410	528,321,500	(†)
1863..................	(†)	(†)	(†)
1864..................	76,801	84,500,000	(†)
1865..................	10,387	10,800,000	(†)
1866..................	18,070	19,900,000	(†)
1867..................	41,000	42,900,000	(†)
1868..................	37,364	41,400,000	(†)
1869..................	84,256	95,051,000	5,636,920
1870..................	87,090	99,452,946	5,724,256
1871..................	144,881	168,878,592	10,281,419
1872..................	128,461	146,906,125	10,019,958
1873..................	108,520	125,346,493	8,898,640
1874..................	89,498	103,241,119	8,203,944
1875..................	116,867	134,504,691	11,516,828
1876..................	144,146	163,418,070	10,870,546
1877..................	169,331	190,672,570	12,024,108
1878..................	127,753	147,101,941	14,237,280

For the year 1879 the number of vessels which entered the port in the foreign trade was 734, of 652,789 tons (of which 204 were American, tonnage 111,968, and 530 foreign, tonnage 540,821); clearances, 722, of 666,037 tons (of which 186 were American, tonnage 111,531, and 538 foreign, tonnage 554,506). In the coastwise trade, 298 vessels of 274,233 tons entered, and 373 of 279,930 tons cleared, the port. The number of vessels belonging to the port was 563, of 85,389 tons, of which 19, of 24,405 tons, were sea-going steamers, and 161, of 29,527 tons, were river-steamers.—The manufacturing interests of *N. O.* are of secondary importance. There are, however, several extensive manufactories of cotton-seed oil, tobacco, soap, vinegar, sirup and cordial, fertilizers, sugar refineries, distilleries, and breweries There are also 2 ice-manufacturing companies, 3 gas companies, 22 banking establishments, several insurance companies, and about 20 daily, weekly, and monthly newspapers and periodicals; the enormous cost of printing being, however, a formidable impediment to the extension of literature in *N. O.* The city is well provided with water, and the fire department is admirably organized.

TARIFF OF PILOTAGE, AND OF COMMERCIAL CHARGES AND RATES, ADOPTED BY THE *N. O.* CHAMBER OF COMMERCE.

Pilotage.

For vessels drawing 10 feet of water or less, \$3 50 per foot; over 10 feet and under 18, \$4.50 per foot; 18 feet and upwards, \$5.50 per foot A fee of \$7.50 to \$20, according to tonnage, is charged on all vessels entering the port, and a ten days' quarantine on vessels from the Gulf and West Indian ports from May 1 to November 1.

Commissions on Sales.

Sugar, cotton, tobacco, lead, flour, and other produce of the soil..............................	2½ per cent.
Foreign merchandise..............................	5 "
Domestic manufactures..............................	5 "
Purchase and shipment of merchandise or produce..............................	2½ "

(†) No data

Receiving and Forwarding Merchandise, exclusive of charges

Sugar, molasses, and tobacco..................	per hhd.,	\$1.50
Cotton..................	" bale,	2.50
Hemp..................	" "	50
Moss..................	" "	20
Provisions, or bacon..................	" hhd.,	50
" "	" tierce,	.25
Box pork..................	" box,	25
Pork, beef, lard, and, tallow..................	" bbl.,	.15
Flour, grain, and other dry barrels..................	" "	08
Lard, nails, and shot..................	" keg,	05
Lead..................	" pig,	03
Corn, wheat, beans, oats, and other grain....	" bag,	05
Whiskey..................	" bbl.,	25
Oils..................	" "	25
Boxes or packages of dry goods, each.........25 cts. to		1 00
Earthen and hardware, per package..........25 cts to		.75
Bar-iron and castings..................	per ton,	1 25
Railroad and pig-iron..................	"	1.00
Hollow ware..................	"	2 50
Soap, candles, wine, etc..................	per box,	.05
Coffee and spices..................	" bag,	.10
Gunpowder..................	" keg,	.50
Salt..................	" sack,	05

Storage and Labor per month

Cotton and wool..................	per bale,	25
Tobacco..................	" hhd.,	50
Hemp..................	per bale 300 lbs.,	.10
"	" 600 "	.20
"	" 800 "	.25
Moss..................	per bale,	.10
Bagging, Kentucky..................	"	.05
" India..................	"	.25
Gunny-bags..................	"	.15
Hides, each..................		.01½
Railroad and pig-iron..................		.50
Bacon and provisions..................	per hhd.,	.25
Pork, beef, lard, etc..................	" bbl.,	08
Molasses, oil, and whiskey..................	" "	.10
Flour..................	" "	.05
Sugar and molasses..................	" hhd.,	40
Havana sugar..................	" box,	.12½
Corn, wheat, and other grain..................	" bag,	.04
Coffee and spices..................		.05
Salt..................		.03
Candles, soap, and fish..................	per box or basket,	.04
Raisins, oils, cigars, etc..................	per box,	04
" " "	half "	.02
Nails..................	per keg,	.03
Dry goods..................	not exceeding 10 feet,	.15
"	" 20 "	.20
"	" 30 "	25
"	" 50 "	.40
Crockery..................	cask or crate,	30
Hardware..................	per cask,	.40
"	" bbl.,	.10
Liquids..................	per pipe or hhd.,	.40
"	per ¼ cask or bbl ,	10
Claret..................	per cask,	20

Weight of Grain per bushel.

Wheat and rye....................................60 pounds.
Corn....................................56 "
Oats....................................32 "

Weights.

When vessels are chartered, or goods shipped, by the ton, and no special agreement respecting the proportion of tonnage which each particular article shall be computed at, the following regulation shall be the standard:—

That the article, the bulk of which shall compose a ton, to equal a ton of heavy materials, shall in weight be as follows:—

Coffee in casks, 1,568 lbs.; in bags, 1,830 lbs.
Cocoa " 1,120 lbs.; " 1,300 lbs
Pimento " 950 lbs.; " 1,100 lbs.
Flour, 8 bbls. of 196 lbs.

Beef, pork, tallow, pickled fish, and naval stores, 6 bbls.

Pig and bar-iron, lead, and other metals or ore, heavy dyewoods, sugar, rice, honey, or other heavy articles, gross, 2,000 lbs.

Ship-bread, in casks, 672; bags, 784; bulk, 896 lbs.

Wines, brandy, and liquids generally, reckoning the full capacity of the casks, wine measure, 200 gallons.

Grain, pease, and beans, in casks, 22 bush.

Grain, pease, and beans, in bulk, 36 bush.

Salt, European, 36 bush.

Salt, West Indian, 31 bush.

Coal, anthracite, 28 bush.

Timber, planks; furs, peltries, in bales or boxes; cotton, wool, or other measurement goods, 40 cubic feet.

Dry hides, 1,120 lbs.

When molasses is shipped by the hogshead without any special agreement, it shall be taken at 110 gallons, estimated on the full capacity of the cask.

Newport. See RHODE ISLAND.

New South Wales. The whole of the eastern part of Australia, now comprising the several British colonies of New South Wales, Victoria, and Queensland, received the name of New South Wales from its first explorer, Captain James Cook, in 1770. The present colony of New South Wales took its origin in a penal settlement formed by the British government when Capt. Arthur Phillip, its first governor, arrived at Botany Bay in January, 1788, with six transports and three store-ships, where they anchored, and subsequently proceeded to Port Jackson, which being more suitable than Botany Bay for the new settlement, the British ensign was for the first time hoisted on the shores of Sydney Cove, now the capital and seat of government. The colony is situated between lat. 28° 15′ and 37° 35′ S., lon. 141° and 153° 35′ E., and comprises an area of 310,937 sq. m. The country is rich in agricultural produce and stock of all kinds, sheep alone numbering 20,962,244. In 1878, 708,431 gallons of wine were manufactured; but the great staple produce is wool, and of late years there has been an immense increase in its export. It also produces gold, silver, coal, iron, copper, tin, kerosene, cotton, and tobacco. In 1878 there were 598 m. of railroad open, and more were constructing. The government is vested in a governor, appointed by the crown, and an executive council of 8 members, nominated by him; a legislative council, consisting of 40 members, together with a legislative assembly of 73 members elected thereto. Pop. 662,212.

Sydney, the capital and principal seaport of New South Wales, situated on a cove on the S. side of Port Jackson, about 7 m. from its mouth, 450 m. N. E. of Melbourne, in lat. 33° 51′ S., lon. 151° 14′ E. Sydney is admirably adapted for the capital of a great trading colony. Port Jackson is one of the finest natural basins in the world. It stretches about 15 m. into the country, and has numerous creeks and bays; the anchorage is everywhere excellent, and ships are protected from every wind. The entrance to this fine bay is between two gigantic cliffs, not quite 2 m. apart. On the most southerly, in lat. 33° 51′ 14″ S., lon. 151° 18′ 15″ E., there is a light-house, with a revolving light visible 21 m. off, the lantern of which is elevated 76 feet above the ground, and about 345 feet above the sea, and on the inner south head there is a fixed light visible for 14 m. The bay is navigable for ships of any burden to the distance of 15 m. from its entrance, or 7 m. above Sydney, up what is called the Paramatta River. Ships come close up to the wharves and stores of the town, their cargoes being hoisted from the ship's hold into the warehouses. Extensive ship-yards and dry-docks furnish every facility for repairing vessels. Sydney is consequently the emporium of all the settlements in this part of Australia, and has a very extensive trade, which has been chiefly increasing since the discovery of gold in 1851. There is a branch mint, which came into work in May, 1855, and by royal proclamation of the same year the gold coinage of Sydney is made legal tender in Great Britain. The Peninsular and Oriental and Panama and New Zealand lines of mail packets have here their depots. The shortest sea-route to London is 12,040 m.; time, 86 days. In 1878 the imports from the U. States amounted to $2,800,000, while the exports to the U. States scarcely reached $350,000. In 1879–80 took place at Sydney an international exhibition at which the products of American industry were highly appreciated and rewarded, and which will undoubtedly have the effect to increase our commercial relations with New South Wales. Pop. in 1878 (with suburbs), 174,249.

Newspaper. See this word in the Appendix.

New York, one of the Middle States of the American Union, lying between lat. 40° 29′ 40″ and 45° 0′ 42″ N., lon. 71° 51′ and 79° 45′ 54″ W. It is bounded N. and N. W. by Lake Ontario, the St. Lawrence River, and Canada; E. by Vermont (from which it is partly separated by Lake Champlain), Massachusetts, Connecticut, and the Atlantic Ocean; S. by the Atlantic, New Jersey, and Pennsylvania; W. by Pennsylvania, Lake Erie, and the Niagara River. Extreme length E. and W., 412 m.; extreme breadth from the Canada boundary to the S. part of Staten Island, 311⅝ m.; area, 47,000 sq. m. Long Island and Staten Island are within the limits of *N. Y.*, whose jurisdiction covers Long Island Sound and the lower waters of the Hudson to low-water mark on the side of New Jersey. The State is divided into 60 counties. Albany is its capital (see ALBANY); New York City is the commercial metropolis of the State and of the U. States (see NEW YORK CITY). The other cities of *N. Y.* are Brooklyn, Buffalo, Cohoes, Elmira, Hudson, Kingston, Lockport, Long Island City, Newburgh, Poughkeepsie, Rochester, Rome, Schenectady, Syracuse, Troy, Utica, Watertown, and Yonkers (see BROOKLYN, BUFFALO, ROCHESTER, SYRACUSE). *N. Y.* is the most populous State in the Union. The following table, made up from colonial statements and the returns of the decennial censuses of the U. States, shows the rapid growth of its population: —

Years.	Population.	Years.	Population.
1698	18,067	1820	1,372,111
1703	20,665	1825	1,614,458
1723	40,564	1830	1,918,608
1731	50,824	1835	2,174,517
1737	60,437	1840	2,428,921
1746	61,589	1845	2,604,495
1749	73,348	1850	3,097,394
1756	96,790	1855	3,466,212
1771	163,337	1860	3,880,735
1790	340,120	1865	3,831,777
1800	589,051	1870	4,382,759
1810	959,049	1875	4,705,208
1814	1,035,910	1880 (?)	5,100,000

The State of *N. Y.* may be described generally as an elevated region with extensive indentations in various parts below its average level. The most remarkable depressions which occur in the surface are the important valleys of the Hudson and Mohawk Rivers, by means of which, and the canal system incidental to them, the basin of the St. Lawrence is at many points placed in communication with the Atlantic. The Blue Ridge of the Alleghanies terminates in this State in the Highlands, whose peaks have a mean altitude of 1,500 feet above the Hudson tide-water; to the N. of these again the Catskill group rise to a superior height, their highest summit, Round Top, having an elevation of 3,804 feet. The Adirondack range, in the wild region W. of Lake Champlain, has for its principal peaks Mount Marcy and Mount Anthony, 5,337 and 5,000 feet high respectively. — The chief river of the State is the Hudson, a broad and deep stream with a tidal flow of 150 m., and traversing a country almost unrivalled for picturesqueness of scenery.

Fig. 370. — SEAL OF NEW YORK.

The St. Lawrence, which forms its N. boundary as aforesaid, the Genesee, Oswego, Mohawk, Oswegatchie, St. Regis, and the headwaters of the Delaware, Susquehanna, and Alleghany, form the remaining chief constituents of the riparian system of the State. Several lakes of considerable size are interspersed throughout the State, the larger ones being those of Champlain, Oneida, Cayuga, Seneca, Canandaigua, George, and Chautauqua. Cataracts of the first order are also contained within its limits, as the famous Falls of Niagara, of the Trenton, of the Genesee, of the Catskill, and the Taghanic Falls. — Gneiss and granite are the most abundant primary rocks, and carboniferous slate, graywacke, and limestone the principal transition and secondary formations. In the latter, to the S. of Lake Erie, many salt springs exist, a bushel of salt being obtained from 45 gallons of brine. Productive salt-beds also occur in the N. central part of the State, near Syracuse, yielding an average of 7,000,000 bushels per annum. Iron is extremely plentiful in the N., where a layer of argillaceous iron ore, yielding from 15 to 30 per cent of metal, extends E. and W. for 200 m. In the Highlands are many beds of magnetic iron ore, and numerous deposits of white marble also are worked at several localities. As the rocks of the Appalachian system are traced from Pennsylvania and New Jersey, those of a later period than the Hudson River slates, instead of crossing the river on the general range of the outcrop toward the N. E., are deflected

toward the N W. before reaching the Mohawk River, the great development of azoic rocks in the N. part of the State seeming to split and turn aside these stratified formations. This is the case with all that group of silurian rocks which compose the Shawangunk Mountains, and run parallel with this ridge from the N. W. corner of New Jersey to the Hudson River at Rondout. In the valley W. of the mountains are the limestones and shales of the Helderberg and Hamilton groups. These rocks, as they approach the Hudson River, sweep around to the W., the great length of the State, and pass across the head of the Niagara River into Canada. In the intermediate formations are included the lead and copper ores of the Shawangunk grit, the fossiliferous iron ores of the Clinton group near Oneida Lake, and the salt and gypsum beds of the Onondaga group. Gypsum occurs in large deposits, and is highly useful in agriculture, being used generally in the proportion of about a ton to 10 or 15 acres of soil. An argillaceous limestone which makes a valuable cement, lead, marble, and peat are the other chief mineral developments. Coal in small quantities has been found, and also petroleum and natural gas, in the W. part of the State. Among the numerous mineral springs those of Saratoga and Ballston Spa are the most frequented watering-places of their kind throughout the Union. — The climate is very variable; but an estimate of five years gives 40° F. as the mean annual temperature of the whole State. Thunder-storms accompanied with lightning occur frequently during the summer solstice, but the atmosphere is, for the most part, dry and equable, and the State is, in general, very healthy. — In the N. and S. W. parts of the State much of the surface is covered with forests, and the principal business of the residents in these districts is the getting in and selling of lumber. There is little or no underwood, and in cultivated tracts, wherever a sufficient quantity of land has been cleared, the woodland of a farm bears as high a price per acre as the land actually cleared. The trees are sometimes above 80 feet in height. Numerous varieties of oak, the hickory, black-walnut, chestnut, plane, maple, ash, beech, elm, tulip-tree (here called poplar), and wild-cherry are ordinary trees, with red-cedar and pine. The locust-tree, which is not indigenous to the State, and the cedar, have been extensively planted, for the purpose especially of ship-building. The soil in the S. is rather unfertile, but it improves on proceeding northward. Along the banks of the St. Lawrence, and in the region around the Oneida, it is well adapted for grain-growing; upon the whole, however, the rearing of live-stock is the most profitable branch of rural industry, and a large portion of the State, especially about its centre, is appropriated to sheep-farming. The principal wheat district commences in the valley of the Mohawk, about lon. 75°, and extends W. to the Great Lakes, including the fertile Seneca Valley and the Genesee country. The average produce of wheat is estimated at from 25 to 30 bushels per acre; but from 40 to 50 bushels are frequently reaped, and instances have occurred of upwards of 80 bushels of wheat, and 25 of Indian corn, per acre having been harvested. Apples, pears, and cherries succeed admirably well. The apples called *Newtown pippins*, produced in this State, are superior to any grown in Europe, and are extensively exported to England. In the remote parts of the State the original log-cabins still remain upon farms well cleared, well fenced, and under high cultivation; but even there they are gradually giving way to more substantial and commodious buildings, and, in many cases, to large and elegant mansions. In the grazing counties the buildings are generally of a better character than in the purely agricultural districts. Long Island and the adjacent county of Westchester, though comparatively unproductive, are more improved and better farmed than most other parts of the State, probably in consequence of their vicinage to the city of New York. Wheat is the most valuable crop, and the attention of the farmers seems chiefly directed to the raising enough of maize for home consumption only, and of wheat for sale. A good deal of buckwheat and rye is grown, but the degree of heat is not favorable for oats and barley. Potatoes, turnips, and other root crops are not at all general in large fields. Hops are grown, but not extensively. Hay is easily made, the sun in the hay-making season being very powerful, and, like other crops in this State, it is seldom damaged by bad weather. Clover and all sorts of grass are used. The soil and temperature of this State are well adapted to the successful cultivation of the principal crops and fruits of the temperate zone. Somewhat more than one half of the total area of the State is improved and under successful cultivation; 37 per cent of the ameliorated land is devoted to pasturage, 25 per cent to meadow-lands, 37 per cent to the raising of oats, Indian corn, wheat, rye, buckwheat, and barley, and 1 per cent to the minor crops and gardens. In the northern counties and the highland regions along the southern border, and near the Hudson, stock and sheep rearing and dairy farming are the almost exclusive agricultural pursuits; while the lowlands, that form the greater part of the surface of the western portion of the State, are best adapted to cereal productions. Broom-corn has long been the staple crop of the Mohawk Valley and its sub-vales; tobacco is extensively raised in the Chemung Valley, and Onondaga and Wayne Cos.; grapes are raised in several of the central lake valleys, and maple-sugar is an important product of the northern and central counties. Orchards are highly productive. Various kinds of excellent apples are grown, and a good deal of inferior cider is made from the crab fruit, selling at from $2 to $4 per barrel of 30 wine gallons. Melons and pumpkins are raised for domestic use and for cattle-feeding Dairy produce forms an important element in the rural economy of the State. Milch-cows sometimes yield 10 or 11 lbs. of butter a week, and perhaps 20 quarts of milk a day. The manufacture of cheese, both for home use and export, is conducted on a large scale. Oxen are much used for ploughing on rough lands, and, like horses, are well trained to their work. Sheep are less attended to than they deserve in a country where the dryness of the weather preserves them from diseases to which they are subject in other lands. The merinos, and crosses with them, are the breeds generally seen; the mutton is generally of inferior quality. The great extent of the forests favors the breeding of hogs, which thrive well, and before being slaughtered are usually fattened with maize or meal. Turkeys, guinea-fowl, and the usual kinds of domestic poultry are in great abundance. The agricultural statistics of this State, as given in the census of 1870, are as follows: Total number of acres of land in farms, 22,190,810, of which 15,627,206 consisted of improved lands, 5,679,870 of woodland, and 883.734 of other unimproved soil; the total number of farms was 216,253, averaging 103 acres; the cash value of farms under cultivation, $1,272,257,766, exclusive of $45,997,712 of implements and machinery; amount of wages paid for husbandry during the year, $34,451,362; total value of farm products, $253,526,153; of orchard stuffs, $6,347,417; of market-gardens, $3,432,354; of lumber, etc., $6,689,079. The relative value of agricultural products and the number and value of live-stock are given in this work under the names of each of the principal crops and animals. — The manufacturing interests of *N. Y.* are most extensive, and in many sections they exceed those of agriculture or commerce. Since the wonderful development of lines of interior communication, manufactures have received an accession of importance which is seen in the flourishing factories and workshops found in almost every part of the State. More than a sixth of all the capital invested in manufactures in the U. States was employed in *N. Y.* according to the last census, and more than a sixth of the value of the entire products of the country was the result of *N. Y.* industry. Nearly every branch of mechanical industry is, more or less, brought into active operation, and it would be tedious to attempt to detail each and every application of such manifold interests. The capital invested in manufactures at the present time is valued at upward of $500,000,000, and the total value of products at $1,000,000,000. — The imports and exports in the several customs districts of the State, for the year 1879, are exhibited in the following table, in which, after the name of the district, is given, when different, the name of the port of entry: —

Districts and ports of entry.	Imports.	Domestic Exports.	Foreign Exports.
New York............	$314,115,362	$338,817,546	$12,409,385
Genesee (Rochester)...	203,593	289,659	53
Oswego..............	5,173,380	944,963	137,010
Niagara (Suspension Bridge)............	2,585,476	24,840	121,673
Buffalo Creek (Buffalo)	3,307,693	224,705	7,791
Oswegatchie (Ogdensburg)..............	777,120	569,344	36,660
Champlain (Plattsburg)..............	2,509,071	2,786,857	2,325
Cape Vincent.........	240,248	129,323	....
Dunkirk.............	422	3	....
Sag Harbor.........	....	23,830	....
Total........	$328,912,365	$343,811,070	$12,714,897

The number and tonnage of vessels engaged in the foreign trade, which entered and cleared the several districts of the State in 1879, and the number and tonnage of vessels registered, enrolled, or licensed, belonging to these districts, were as follows: —

Districts.	Entered.		Cleared.		Registered, etc.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New York.....	7,569	6,661,825	6,957	6,404,847	4,359	1,025,641
Champlain...	1,099	95,580	1,079	101,143	446	42,644
Oswegatchie..	422	84,435	395	82,052	37	7,014
Cape Vincent.	931	74,675	921	73,686	53	4,943
Oswego......	1,775	289,631	1,770	288,636	129	22,604
Genesee......	470	102,631	433	96,408	26	4,330
Niagara......	386	151,229	384	150,525	12	3,136
Buffalo Creek.	473	81,134	420	70,266	220	102,192
Dunkirk.....	12	1,228	13	1,534	6	1,129
Sag Harbor..	......	....	......	....	273	14,732
Total....	13,137	7,542,368	12,372	7,269,097	5,361	1,228,275

The number and tonnage of vessels which entered and cleared in the coastwise trade, and the number and tonnage of vessels built, in the different districts, during the year 1879, were as follows : —

Districts.	Entered		Cleared.		Vessels built.	
	Vessels.	Tons.	Vessels.	Tons.	Vessels.	Tons.
New York...	2,014	1,716,155	3,135	2,068,817	135	11,265
Genesee	52	5,953	69	9,644	1	135
Oswego......	527	92,481	526	96,365	......	....
Niagara.....	360	127,566	360	128,284	7	673
Buffalo Creek	3,444	2,029,269	3,523	2,029,402	9	1,986
Oswegatchie.	583	106,620	599	107,210	1	7
Champlain..	......	....	773	65.709	11	1,215
Cape Vincent	467	43,261	483	45,264	6	99
Dunkirk.....	44	12,063	41	11,452	......	....
Sag Harbor..	31	2,987	31	2,987	6	49
Total....	7,522	4,136,355	9,540	4,565,134	176	15,429

The following statement exhibits the condition of the *National Banks* in *N. Y.* State (exclusive of the city of New York) at the beginning of the years 1879 and 1880, as shown by their reports to the Comptroller of the Currency : —

Resources.	January 1, 1879, 234 banks.	January 1, 1880 239 banks.
Loans and Discounts........	$65,675,992 11	$70,014.507 18
Bonds for Circulation.... ..	31,477,400 00	31,690,550 00
Bonds for Deposits..........	2,082,300 00	1,045,500 00
U. S. Bonds on hand	5,171,200 00	6,532.450 00
Other Stocks and Bonds....	3.371,406 10	4,030,010 33
Due from Reserve Agents....	10,236,684 15	13,663,650 32
Due from National Banks...	2,380,750 63	2,990,569 61
Due from State Bànks......	693,020 46	800,871 19
Real Estate, etc............	3,589,668 97	3,767,642 01
Current Expenses..........	367,174 81	608,365 79
Premiums paid.............	495,280 64	355,476 41
Cash Items................	1,940,279 47	1,026,145 61
Clearing-House Exchanges..	158,510 83	149,350 15
Bills of other Banks........	1,181,639 00	947,793 00
Fractional Currency........	39,596 96	30,491 00
Specie.....................	1,476,934 23	1,736,017 59
Legal Tender Notes	4,457,610 00	3,632,987 00
U. S. Certificates of Deposit.	750,000 00	615,000 00
Due from U. S. Treasurer...	1,467,871 38	1,519,182 91
Total Resources........	137,013,319 74	145,156,560 10
Liabilities.		
Capital Stock..............	35,185,691 00	34,502,160 00
Surplus Fund...............	9,072,196 30	8,830,824 14
Undivided Profits......	4,486,072 35	5,153,881 91
National Bank Circulation..	27,760,527 00	28,154,625 00
State Bank Circulation......	68,915 00	57,047 00
Dividends unpaid	364,524 78	65,177 90
Individual Deposits	50,867,103 30	58,641,559 63
U. S. Deposits..............	1,556,487 26	557,538 33
Deposits of U. S. Disbursing Officers..................	112,738 84	96,511 86
Due to National Banks......	4,805,759 27	6,287,993 94
Due to State Banks.........	1,566,586 67	2,120,860 08
Notes re-discounted.........	375,485 99	110,065 66
Bills payable...............	791,231 98	578,314 65
Total Liabilities........	$137,013,319 74	$145,156,560 10

The following statement exhibits the condition of the *State Banks* or banks incorporated under the banking laws of the State of *N. Y.* (including the city of New York) on March 15, 1879, and Jan. 1, 1880, as shown by their reports to the Superintendent of the Bank Department : —

Resources.	March 15, 1879, 71 banks.	January 1, 1880, 71 banks.
Loans and Discounts, less due from Directors........................	$48,581,970	$54,566,284
Due from Directors.................	2,502,634	2,697,837
Overdrafts.........................	79,311	101,255
Due from Trust Companies, State, National, and Private Banks, and Brokers..........................	5,420,683	7,812,183
Real Estate.........................	2,336,879	2,278,278
Bonds and Mortgages...............	377,485	344,453
Stocks and Bonds...................	7,691,176	6,372,599
Specie..............................	1,656,855	3,740,795
U. States Legal Tender Notes and Circulating Notes of National Banks..	5,229,383	3,944,108
Cash Items.........................	6,929,289	11,316,651
Loss and Expense Account..........	289,757	590,723
Assets not included in either of the above heads	142,217	257,847
Add for Cents......................	236	225
Total Resources................	81,237,875	94,023,238
Liabilities.		
Capital.............................	19,543,200	19,163.200
Surplus Fund.......................	4,528,171	4,544,581
Undivided Profits..................	2,597,865	3,559,667
Circulation.........................	37,860	37,673
Due Depositors on demand..........	48,372,319	58,454,053
Due to Trust Companies, State, National, and Private Banks, and Brokers...........................	4,839,673	6,686,044
Due Individuals and Corporations other than Banks and Depositors..	366,565	426,338
Due Treasurer of the State of New York..........................	515,186	678,618
Amount due, not included in either of the above heads................	438,912	472,936
Add for Cents......................	124	128
Total Liabilities................	$81,237,875	$94,023,238

Statement exhibiting the number of *Savings Banks* in the State of *N. Y.* (including New York City), the amount of Deposits, the number of Depositors, and the average due each Depositor on the 1st of Jan. of the 10 years from 1871 to 1880 : —

Years.	No. of Banks.	Amount of Deposits.	No. of Depositors.	Average due each Depositor.
1871....	136	$230,749,408	712,109	$324 03
1872....	147	267,905,826	776,700	344 92
1873....	150	285,286,621	822,642	346 79
1874....	155	285,520,085	839,472	340 12
1875....	158	303,935,649	872,498	348 35
1876....	154	319,260,202	859,738	371 35
1877....	150	316,677,285	849,636	372 72
1878....	138	312,823,058	844,550	370 40
1879....	132	299,074,639	810,017	369 22
1880....	128	319,266,020	870,622	366 71

N. Y. is distinguished above every other State in the Union by her extensive inland water communications. Of these, the principal, formed partly by the navigable river, the Hudson, and partly by the Erie Canal 364 m. in length, from Albany on the Hudson to Buffalo on Lake Erie, connects the city of New York with the great American lakes, and makes her, in fact, the proper port of Upper Canada, and of all the vast and fruitful countries surrounding those lakes. Upper Canada may, indeed, be reached from Europe by way of *N. Y.* in less than half the time in which it can be reached *via* the St. Lawrence and Quebec, and with incomparably less risk. Other canals, navigable feeders, and river improvements, extend to 907 m., the length of the artificial system of navigable waters in *N. Y.* (see CANAL). The following statement shows the estimated value of all property transported on each canal in the State of *N. Y.* in each year, from 1876 to 1879 : —

Canals.	1876.	1877.	1878.	1879.
Erie..................................	$88,617,224	$114,673,917	$159,336,566	$259,776,034
Champlain	14,960,660	16,362,982	15,953,176	17,887,619
Oswego	6,903,257	6,445,895	5,463,977	6,512,437
Cayuga and Seneca.........	837,720	1,203,243	891,936	590,830
Chemung	918.168	58,538	44,960	....
Chenango............................	38,690	....	....	....
Black River.........................	477.005	432,565	455,854	513,806
Genesee Valley......................	337,655	243,823	108,059	....
Oneida Lake	....	....	....	....
Baldwinsville........................	....	....	....	....
Oneida River Import	....	... .	....	....
Seneca River Tow Path...............	....	....	....	....
Cayuga Inlet	....	....	....	....
Crooked Lake	....	....	....	....

The first railroad was opened in 1831; it was the Mohawk and Hudson (from Albany to Schenectady), 17 m. In 1846 the State had 727 m. of railroads: in 1850, 1,361 m.; in 1855, 2,583 m.; in 1860, 2,682 m.; in 1865, 3,002 m.; in 1870, 3,928 m.; in 1873, 4,927 m.; and in 1879, 5,840 m. The two principal railroad corporations of the State are the New York Central and Hudson River, which is a consolidation of numerous lines; and the New York, Lake Erie, and Western, which, besides its branches, operates several leased lines. The following table exhibits the names of the lines wholly or partly within the State, together with the total length of these lines between termini, the total length in operation within the State in 1879, and the cost of construction per mile. Several of the lines given in this table are only branches of other more important lines, and for the sake of brevity, the lines under 5 m. in length have been omitted.

Name of lines.	Total length of line.	Total length of line in *N. Y.*	Cost of construction per mile.
	Miles.	Miles.	$
Adirondack	60.00	60.00	51,225
Albany and Susquehanna	142.59	142.59	69,559
Atlantic and Great Western	422 83	49.24	210,224
Avon, Gen. and Mt. Morris	17.56	17.56	15,696
Bath and Hammondsport	9 04	9.04	14,656
Black River and Morristown	36.60	36.60	18,501
Black River and St. Lawrence	12.00	12.00	12,035
Boston and Albany	249 63	56.53	115,536
Boston, Hoosac Tunnel, & Western.	26.00	26.00	38,095
Brooklyn, Flatbush, & Coney Island	8.00	8.00	156,384
Brooklyn and Jamaica	9.98	9.98	50,000
Buffalo, Bradford, and Pittsburgh	25.97	7.80	110,346
Buffalo, Chat. Lake, and Pittsburgh	44.00	37.00	45,454
Buffalo, and South-western	67.24	67.24	42,969
Buffalo, New York, and Erie	139.95	139.95	23,786
Buffalo, New York, and Philadelphia	120.55	78.65	54,378
Carthage, Watert'n, & Sackett's Har	30.00	30.00	26,226
Cayuga Southern	38.00	38.00	34,211
Cayuga and Susquehanna	34.61	34.61	21,500
Cazenovia, Canastota, & De Ruyter.	29.25	29.25	20,922
Chemung	17.40	17.40	21,840
Cherry Valley, Sharon, & Albany	20.91	20.91	28,694
Clayton and Theresa	15.86	15.86	20,285
Cooperstown & Susquehanna Valley	16.00	16.00	30,749
Corning, Cowanesque, and Antrim	64.00	15.64	37,256
Danamora	16.00	16.00	20,562
Dunkirk, Alleghany Val., & Pitts	90.60	42.30	53,106
Elmira, Jefferson, and Canandaigua	46 60	46.60	10,730
Elmira State Line	6 52	6.52	29,176
Elmira and Williamsport	76.70	6.80	35,450
Erie and Genesee Valley	12.29	12.29	15,566
Flushing, North Shore, and Central	53 15	53.15	88,247
Fonda, Johnstown, and Gloversville.	10.00	10.00	53,251
Geneva and Lyons	15.00	15.00	33,000
Geneva, Ithaca, and Sayre	75.63	75.63	32,623
Gloversville and Northville	16.17	16.17	16,789
Goshen and Deckertown	11.65	11.65	24,107
Greene	8.00	8.00	50,011
Greenwich and Johnsonville	14.00	14.00	22,425
Harlem River and Portch	11.80	11.80	213,699
Ithaca, Auburn, and Western	27.00	27.00	55,000
Jersey City and Albany	24.00	1.00	30,829
Junction, Buffalo	7.67	7.67	27,909
Lackawanna and Susquehanna	22.01	17.45	53,367
Lake Champlain and Moriah	7.66	7.66	60,300
Lake Shore and Michigan Southern	864.60	71.00	92,502
Lebanon Springs	57.00	51.00	70,176
Lockport and Buffalo	6.00	6.00	33,333
Long Island	157 94	157.94	40,052
Middleburg and Schoharie	5.75	5.75	18,260
Middletown and Crawford.	10.22	10.22	19,071
Middlet'n, Unionville, & Water Gap.	13.00	13.00	26,960
Montgomery and Erie	10 26	10.26	27,103
Newburgh, Dutchess, & Connecticut	58.58	58.58	35,026
Newburgh and New York	12.59	12.59	21,213
New Jersey and New York.	31.50	18.50	71,270
New York and Canada	149.93	149.93	54,358
New York Central & Hudson River.	740.17	740.17	135,621
New York Elevated	14.85	14 85	573,278
New York and Harlem	126.96	126.96	166,782
New York, Lake Erie, and Western.	525.69	484.21	223,833
New York and Mahopac	7.09	7.09	37,440
New York and Manhattan Beach	14.79	14.79	58,450
New York, New Haven, and Hartford	140.50	15.13	111,979
New York and Oswego Midland	344.00	344.00	76,243
New York and Rockaway	8.98	8.98	38,750
Niagara Bridge and Canandaigua	98.46	98.46	10,156
Northern of New Jersey	21.25	1.44	25,059
Ogdensburg and Lake Champlain	122.00	122.00	48,110
Ogdensburg and Morristown	10.62	10.62	11,125
Olean, Bradford, and Warren	23.00	12.53	11,290
Ontario Southern	33.60	33.60	42,914
Oswego and Rome	28.58	28.58	31,914
Oswego and Syracuse	34.98	34.98	50,358
Port Jervis and Monticello	23.75	23.75	47,329
Poughkeepsie, Hartford, and Boston	42.66	42.66	35,160
Rensselaer and Saratoga	182.62	182.62	35,926
Rhinebeck and Connecticut	35.20	35.20	41,101
Rochester and Genesee Valley	18.26	18.26	36,770
Rochester and State Line	107.56	107 56	43,579
Rome and Clinton	12.70	12.70	28,348
Rome, Watertown, and Ogdensburg	380.30	380.30	24,588
Schenectady and Duanesburg	14.50	14.50	41,414
Silver Lake	6.50	6 50	20,250
Skaneateles	5.50	5.50	32,911
Smithtown and Port Jefferson	19.02	19 02	29,822
Southern Central	114.00	114.00	32,116
Southern of Long Island	68.12	68.12	43,668
Springville and Sardinia	12 00	12.00	17,500
Spuyten Duyvil and Port Morris	6.04	6.04	163,423
Staten Island	13.00	13 00	37,000
Sterling Mountain	7.60	7.60	64.852
Suspension Bridge and Erie Junc	23.28	23.28	50,045
Syracuse, Binghamton, & New York	81.00	81.00	49,862
Syracuse, Chenango, and New York	43.49	43.49	24,475
Syracuse, Geneva, and Corning	57.25	57.25	39,385
Syracuse Junction	7.81	7.81	91,213
Troy and Bennington	5.38	5.38	44,044
Troy and Boston	34.74	34.74	82,143
Troy and Greenbush	6.00	6.00	49,168
Ulster and Delaware	74.00	74.00	18,143
Utica and Black River	87.00	87.00	16,457
Utica, Chenango, and Susq. Valley.	98.00	98.00	42,327
Utica, Clinton, and Binghamton	31.30	81.30	41,518
Utica, Ithaca, and Elmira	71.00	71.00	40.226
Valley	11.50	11.50	73,310
Wallkill Valley	33.00	33.00	27,492
Warwick Valley	10.16	10.16	19,670

The *Public Debt* of the State of *N. Y.* at the close of the fiscal years 1877-79, as stated in the annual reports of the Comptroller of the State, was as follows: —

	1877.	1878.	1879.
	$	$	$
General Fund	926,694.87	122,694.87	122,694.87
Canal	9,900,360.00	9,020,360.00	8,988,360 00
Bounty	130,000.00	11,000.00	11,000 00
Total	10,957,054.87	9,154,054.87	9,122,054 87

The *assessed valuation* of the real and personal property of the State of *N. Y.* for the year 1845, 1855, and from 1866 to 1879, was as follows: —

Years.	Real Estate.	Personal Estate.	Aggregate equalized Valuation.
1845	$1,161,750,000	$339,249,877	$605,646,095
1855	1,158,327,371	392,552,314	1,402,849,304
1866	1,196,403,416	334,826,220	1,531,229,636
1867	1,237,703,092	426,404,633	1,664,107,725
1868	1,327,403,886	438,685,254	1.766,089,140
1869	1,418,132,855	441,987,915	1,860,120,770
1870	1,532,720,907	434,280,278	1,967,001,185
1871	1,599,930,166	452,607,732	2,052,537,898
1872	1,644,379,410	444,248,035	2,088,627,445
1873	1,692,523,071	437,102,315	2,129,626,386
1874	1,750,698,918	418,608,955	2,169,307,873
1875	1,960,352,703	407,427,399	2,367,780,102
1876	2,108,325,872	357,941,401	2,466,267,273
1877	2,376,252,178	379,488,140	2,755,740,318
1878	2,373,418,490	364,960,110	2,738,378,600
1879	2,333,669,813	352,469,320	2,686,139,133

Islands. The principal islands belonging to the State are Manhattan, Staten, Long, Gardiner's, Shelter, Plum, Fisher's, Hart's, Randall's, Ward's, Blackwell's, Governor's, Bedloe's, Ellis, Coney, Barren, Fire, etc., in tidal waters; Grand, Squaw, Stanberry, Rattlesnake, Tonawanda, Beaver, Buckhorn, Cayuga, and Goat, in Niagara River; Carlton, Grenadier, Fox, Wells, Grindstone, Gallop, and many of the Thousand Islands, in the St. Lawrence; Valcour, Crap, and Schuyler, in Lake Champlain. Of these the principal besides Manhattan, on which *N. Y.* City is mainly built, is

Long Island, situated between lat. 40° 33′ and 41° 10′ N., lon. 71° 51′ and 74° 2′ W., and bounded N. by Long Island Sound, which separates it from Conn., E. and S. by the Atlantic Ocean, W. and N.W. by the Narrows, New York Bay, and the East River, which last separates it from New York City. It is about 110 m. long, its greatest width being nearly 20 m.; area, 1,682 sq m. It contains 3 counties, — Kings on the W. end, Queens in the middle, and Suffolk on the E. end of the island. A chain of hills runs from W. to E., on the N. of which the surface is somewhat hilly and broken; on the S. it is level. The N. shore is somewhat bold; on the S. it is a beach of sand and gravel, enclosing bays, with various inlets, admitting vessels of 60 or 70 tons, and abounding with shell and other fish. At the E. end is Gardiner's Bay and Island, and Montauk Point, a bold promontory, on which is a light-house. The N. shore has several light-houses. The E. portion forms the customs district of Sag Harbor, where the cod and mackerel, and chiefly the menhaden, fishery, is an important branch of industry. The city of Brooklyn is situated on the W. end (see BROOKLYN). At the N. W. end, opposite the upper part of N. Y. City, is Long Island City (pop. 25,000), which has a water-front of 10 m., from Hewtown Creek, which separates it from Brooklyn, to Bowery Bay. It includes Hunter's Point, Astoria, Ravenswood, Dutch. Kills, Blissville, etc., and is the W. terminus of the Long Island R.R., and of the Flushing and Northside R.R. It contains many important manufactories, and is the great depot for the storage and shipment of refined petroleum consigned to the *N. Y.* market. Pop. of the island, about 600,000.

New York (City), the principal city of the State, the commercial metropolis of the U. States, and one of the greatest cities of modern times, mainly on Manhattan Island, at the point of confluence of the Hudson River, which separates Manhattan from New Jersey, with East River, which separates it from Long Island, 145 m. below Albany, 18 m. from the Atlantic Ocean, and 90 m. N. E. of Philadelphia, in lat. of the City Hall, 40° 42′ 43″ N., lon. 74° 0′ 3″ W. Besides Manhattan, which is separated from the main land by Spuyten Duyvil Creek and Harlem River, *N. Y.* includes in its limits Governor's, Bedloe's, and Ellis islands in *N. Y.* Bay; Blackwell's, Ward's, and Randall's islands in East River, and a large portion of the main-land N. of Manhattan; its total length from the Battery on the S. to Mount St. Vincent on the N. being about 16 m., and its maximum breadth from the mouth of the Bronx W. to the Hudson $4\frac{1}{2}$ m.; its total area being about $41\frac{1}{2}$ sq. m., or 26,560 acres, of which about 14,000 acres are within Manhattan Island, and upwards of 12,000 acres on the main-land. *N. Y.* has increased very fast, chiefly during the second part of this century, its population having more than doubled during the last thirty years, as shown in the following statement, compiled from the several colonial, state, and federal censuses: —

Years.	Population.	Years.	Population.
1656........	1,000	1825........	166,086
1698........	4,937	1830........	202,589
1731........	8,622	1835........	268,089
1756........	13,046	1840........	312,710
1786........	23,613	1845........	371,223
1790........	33,131	1850........	515,547
1795........	......	1855........	629,810
1800........	60,515	1860........	813,669
1805........	......	1865........	726,386
1810........	96,373	1870........	942,292
1814........	95,519	1875........	1,046,037
1820........	123,706	1880........	1,250,000

If to the population of *N. Y.* proper in 1880 we add that of Brooklyn, Jersey City, and other neighboring communities, which are practically the suburbs of *N. Y.*, we find, within a radius of 20 m. from the City Hall, a compact agglomeration of 2,200,000, which is the true population of the great metropolis. — *N. Y.* is in great part indebted, for its wonderful increase, to its admirable situation. The rise of the tide is about 6 feet; and even at ebb there are 21 feet water on the bar; and the water in the outer and inner bays, and in the river, is so deep, that ships of the largest burden lie close to the quays, and may proceed to a great distance up the Hudson. The navigation of the bay is rarely impeded by ice. The great strength of the tide, and the vicinity of the ocean, keep it generally open, even when the Chesapeake and Delaware are frozen over. These natural advantages have been vastly extended by a system of canals which has connected the Hudson not merely with Lake Ontario and Lake Erie, but with the Ohio River, and consequently with the Mississippi and the Gulf of Mexico. As soon as the Erie Canal was opened, in 1825, the city of *N. Y.*, then smaller than Philadelphia, began to grow at a wonderful rate, and very soon left all other American cities behind. Notwithstanding the prodigious development of the American system of railroads, *N. Y.* still retains most of its natural advantages. The coast cities north of it, like Boston and Portland, are a little nearer to Europe; but lacking its facilities for cheap communication with the West, they can never rival it. The cities to the south, like Philadelphia and Baltimore, are nearer by rail to the great grain-marts of the West, but they are at a considerable distance from the ocean, and when vessels freighted at their docks emerge into the open sea they have still a longer voyage to Europe than vessels clearing from this port, which is a great disadvantage for steamers, every additional ton of coal required for completing the voyage being a ton deducted from their capacity for freight. *N. Y.* is becoming more and more the centre of the world's traffic, and everything points to a great and rapid growth of our commercial city in population and wealth. *N. Y.* has numerous lines of steamers to all the southern and northern coastwise ports; 6 lines of steamers to the West Indies and South America, including a line to Rio de Janeiro, and the Pacific Mail line to San Francisco *via* the isthmus of Panama; and 18 weekly transatlantic lines, having 181 steamers of about

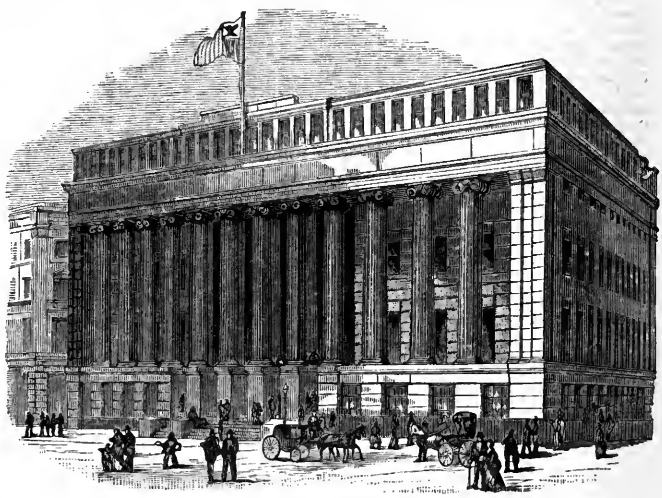

Fig. 371. — CUSTOM-HOUSE.

550,000 tons, leaving regularly on Tuesdays, Wednesdays, Thursdays, and Saturdays for London, Liverpool, Glasgow, Cardiff, Newcastle-upon-Tyne, Bristol, Havre, Bordeaux, Antwerp, Hamburg, Bremen, Rotterdam, and Stettin, several of them touching at Cherbourg, Southampton, Plymouth, Queenstown, Cork, Copenhagen, and Bergen. A description of *N. Y.* must not be expected in a book exclusively devoted to commerce; and as the magnitude of its commerce and industry is illustrated in almost every page of this work, we propose to condense here only the information which could not find more convenient room under special headings.

Entrance to Harbor. The course in entering the harbor of New York is nearly due west from the outermost white buoy on the bar, till the buoy on the southwest point of the east bank be passed, and then nearly due north. The navigation is extremely easy. Pilots generally board vessels without the bar; for, otherwise, they are only entitled to half fees. Were it not for fear of vitiating insurances, their services would seldom be required.

The lights and light-houses in New York Bay are as follows: first, the Sandy Hook light vessel, 6 m. from Sandy Hook, having a fog bell and horn, lat. 40° 27′ 39″ N., lon. 73° 52′ W. Then south of Sandy Hook are the 2 Navesink light-houses, standing 76 yards apart, each 258 feet above high water, and visible, in clear weather, for 25 m. Next, on Sandy Hook, at the south point of the entrance to New York Bay, lat. 40° 27′ 39″ N., lon. 73° 59′ 49″ W., is a white tower, exhibiting, at 90 feet above the sea, a fixed white light, visible 15 m. Here is also a fog-bell, which strikes seven times a minute. On Sandy Hook, northward of the light-house, are two white beacons, exhibiting fixed white lights, each 35 feet above the sea, and visible for 10 m. There are 2 more beacon lights; one near the beach, and one on Chapel Hill, in the main channel; another, ¾ m. S. W. of Point Comfort; another, ¾ m. southerly from the above; one near Elm Tree Station on Staten Island, and another at New Dorp, 1½ m. N. W. of it; another on Staten Island; another, which flashes every two minutes, near the S. E. end of Staten Island; another on Staten Island, west side of the Narrows; and lastly, one on Robbin's reef. Here is also a fog-bell.

Shipping and Ship-building. The port of *N. Y.* has 24¾ m. of available water-front and about 80 piers on Hudson River, 9½ m. and 70 piers on East River, and 2½ m. on Harlem River. The plan for the much-needed improvement of the water-front, now in course of execution, but which ought to be pushed with more vigor, consists of a wall of masonry built far enough in advance of the present bulkhead to give room for a river street 250 ft. wide along the Hudson, about 200 ft. wide along East River below 31st Street, and 175 ft. above. Piers from 500 to 600 ft. long, and mostly built of preserved wood, will project from the wall into the river. The foreign trade of *N. Y.* being now mostly conducted in foreign bottoms, its shipping has been gradually diminishing from 2,328,884 tons in 1844, to 1,025,641 tons in 1879. In the last-named year the number and tonnage of sailing vessels, steam vessels, barges, and canal boats belonging to its port, and the vessels built during the year, were as follows: —

Class of Vessels.	Belonging to port.		Built in 1879.	
	No.	Tons.	No.	Tons.
Sailing vessels..........	2,623	579,804	76	4,564
Steam vessels...........	796	289,478	33	3,062
Barges..................	536	124,045	11	2,037
Canal boats.............	404	32,314	15	1,602
Total...............	4,359	1,025,641	135	11,265

The number and tonnage of vessels which entered and cleared the port in the foreign trade for the year 1879 was as follows: —

Entrances.

	Sailing vessels.		Steamers.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
American ..	2,208	865,150	189	379,653	2,397	1,244,803
Foreign.....	3,964	2,166,076	1,208	3,250,946	5,172	5,417,022
Total	6,172	3,031,226	1,397	3,630,599	7,569	6,661,825

Clearances.

	Sailing vessels.		Steamers.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
American ..	1,775	729,265	189	378,048	1,966	1,107,313
Foreign.....	6,788	2,047,722	1,203	3,249,812	4,991	5,297,534
Total	5,563	2,776,987	1,392	3,627,860	6,957	6,404,847

The entrances and clearances in the coastwise trade for the same year are shown in the following table: —

	Sailing vessels.		Steamers.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
Entrances..	829	208,735	1,185	1,507,420	2,014	1,716,155
Clearances..	1,566	364,432	1,569	1,704,385	3,135	2,068,817

NOTE. — This statement includes only such movements of vessels in the coastwise trade and fisheries as may come within the provisions of sections 43-49 *et seq.* of the Revised Statutes of the U. States, requiring entry or clearance to be made under certain conditions; such as, for instance, if a vessel has a certain amount of foreign goods on board, or passes from a port in one great coasting district to a port in another great coasting district, etc. Since the movement of vessels in the coastwise trade, requiring entry and clearance to be made, comprise but a small portion of such movements of vessels between ports of the U. States, this statement is a very incomplete view of the entire movements of tonnage in the coastwise trade and fisheries.

Foreign Commerce. The following statement exhibits the value of the foreign imports and exports into and from the port of *N. Y.* for the 20 years from 1860 to 1879, and its percentage of that of the whole U. States. The great excess of percentage of imports over the domestic exports is accounted for by the fact, that while the articles of export from the Southern and partly from the Western States are shipped at New Orleans, the greater part of the more valuable articles brought from abroad, and destined for the consumption of the same States, is imported into *N. Y.*

Years.	Imports.	Percentage.	Exports (foreign).	Percentage.	Exports (domestic).	Percentage.	Total exports and imports.	Percentage.
	$		$		$		$	
1860.........................	233,692,941	64½	17,514,689	65½	120,630,955	27½	371,838,585	48½
1861.........................	189,064,817	66½	13,311,495	65	137,379,956	60	373,657,725	64
1862.........................	142,215,636	69	5,069,953	62½	152,377,961	71½	304,995,681	70
1863.........................	177,254,415	70	17,369,353	65¼	221,917,978	72½	416,541,748	71
1864.........................	229,506,499	69½	12,735,640	60	211,237,222	66	453,479.361	67¾
1865.........................	154,139,409	62	22,627,018	73¼	219,379,873	67¼	396,157,710	65½
1866.........................	302,505,719	68	....	...	264,510,247	48	574,469,811	57
1867.........................	277,469,510	66¼	....	...	207,382,457	47¼	496,087,178	56½
1868.........................	242,580,659	65¼	15,016,273	68	236,031,239	52	493,627,171	58
1869.........................	295,117,682	67½	17,741,836	68	185,384,264	44¾	498,243,782	57
1870.........................	293,990,006	63½	20,339,410	66½	209,972,491	42	524,301,907	53
1871.........................	357,909,770	66	20,087,211	76	285,530,775	50	673,527,756	59½
1872.........................	418,515,829	65¼	15,161,218	53½	270,413,674	49¾	704,090,721	58
1873.........................	426,321,427	64½	18,972,099	78¼	313,129.963	48	758,423,489	56½
1874.........................	395,133,622	66¼	14,633,463	63½	340,360,269	49	750,127,354	57
1875.........................	368,637,580	66¼	15,502,056	71	329.201,913	50	713,341,558	57¾
1876.........................	311,712,910	65¼	13,868,321	61	294,705,902	45	620,285.133	53¾
1877.........................	330.031,959	65	17,270,761	68	300,968,561	43½	648,271,281	54½
1878.........................	313,179,649	67	12,823,872	60	338,992.748	46½	664,996,269	54¾
1879.........................	314,115,362	67¼	12,409,385	63	338,817,546	47¼	665,342,293	55⅓

Statement exhibiting the total values of imports and exports (domestic and foreign) to the principal foreign countries of the world from the port of N. Y. during the fiscal year 1879: —

Countries.	Imports from	Exports to.
Argentine Republic	$1,318,144	$1,923,994
Austria	315,813	1,689,430
Belgium	3,079,624	17,851,261
Brazil	25,621,419	4,421,629
Central America States	280,614	374,894
Chili	292,811	711,166
China	7,127,213	2,533,880
Denmark	15,066	1,741,904
Danish West Indies	702,605	702,067
France	50,070,113	46,755,598
French West Indies	1,635,268	924,080
Germany	34,147,238	31,707,354
Great Britain — England	66,304,248	140,303,844
Great Britain — Scotland	8,362,477	21,413,912
Great Britain — Ireland	1,958,954	10,067,727
Gibraltar	9,689	1,070,967
Dominion of Canada	945,420	1,318,717
Newfoundland and Labrador	342,652	961,866
British West Indies	2,619,621	5,251,008
British Guiana	244,241	1,017,997
British Honduras	191,777	250,195
British East Indies	8,971,396	1,011,161
Hong-Kong	1,561,638	54,565
British possessions in Africa	160,707	838,660
British poss. in Australasia	166,063	4,928,916
Greece	351,830	277,414
Hayti	3,295,063	2,601,537
Holland	3,493,578	8,046,441
Dutch West Indies	665,795	596,421
Dutch East Indies	3,971,775	1,398,692
Italy	5,586,320	3,218,907
Japan	3,125,620	1,769,319
Liberia	51,546	130,602
Peru	1,324,347	792,917
Portugal	389,483	2,056,344
Russia	235,323	702,099
San Domingo	516,541	793,048
Spain	2,674,706	4,793,884
Cuba	44,895,007	2,542,733
Porto Rico	2,167,124	1,464,481
Other Spanish possessions	4,048,186	306,667
Sweden and Norway	75,748	1,348,651
Turkey	400,277	1,412,812
United States of Colombia	7,041,634	4,885,806
Uruguay	1,645,315	679,063
Venezuela	5,186,342	1,836,237
All other countries	612,856	1,208,723
Total	$314,115,362	$351,226,935

The following table exhibits the articles entering in the above statement of imports and exports, and whose value is above $500,000: —

IMPORTS.

Argols (13,451,966 lbs.)		$1,818,022
Barks, medicinal (5,877,997 lbs.)		1,583,356
Chemicals, drugs, etc. (free of duty)		3,383,761
Cocoa (3,900,759 lbs.)		733,345
Coffee (259,228,451 lbs.)		32,739,331
Cutch or Catechu (14,137,393 lbs.)		550,321
Dye-woods (945,212 cwt.)		910,398
Fur Skins, undressed		745,201
Gold and Silver, bullion and coin		11,766,309
Gums (11,208,684 lbs.)		1,449,298
Hides and Skins, other than furs		10,043,577
India-rubber and gutta-percha, crude (21,865,875 lbs.)		4,713,704
Indigo (1,147,524 lbs.)		977,713
Bags of cotton or linen (65,502,073 lbs.)		1,830,394
Silk, raw (451,837 lbs.)		2,039,694
Soda, nitrate of (50,693,289 lbs.)		873,429
Sulphur or Brimstone, crude (36,543 tons)		827,193
Tea (43,416,979 lbs.)		9,819,720
Tin, in bars, blocks, or pigs (125,168 cwt.)		2,021,373
Wood, unmanufactured		874,307
Books, engravings, etc		1,548,733
Buttons and Button materials		3,029,731
Chemicals, drugs, etc. (dutiable)		2,965,386
Cotton, manufactures of —		
Bleached and unbleached (5,422,545 sq. yds.)	$653,024	
Printed, painted, or colored (2,883,950 sq. yds.)	431,599	
Hosiery, shirts, and drawers	4,446,753	
Other manufactures	12,087,078	17,618,454
Earthen, stone, and china ware		2,425,016
Fancy goods		$3,422,878
Sardines and anchovies, preserved in oil		658,330
Flax, raw (883 tons)	$448,891	
Manufactures of, by yard	10,326,704	
Other manufactures	2,005,913	12,781,508
Fruits and nuts		17,978,789
Glass and glass-ware		2,748,103
Hemp, raw (13,086 tons)		1,336,256
Iron and steel, and manufactures of —		
Pig-iron (115,870,001 lbs.)	1,188,498	
Steel ingots, bars, sheets, and wire	710,154	
Cutlery	1,080,327	
Other manuf. of iron and steel	2,395,864	5,374,843
Jute and other grasses, raw (57,127 tons)		3,150,292
Leather of all kinds (4,804,835 lbs.)	3,189,509	
Gloves of kid, and all others of skin (628,249 doz. pairs)	3,143,219	6,332,728
Musical instruments		505,013
Opium, and extract of (216,042 lbs.)		722,816
Paintings, chromo-lithographs, etc.		923,939
Paints		617,016
Potatoes (1,136,303 bush.)		659,663
Precious stones		3,624,893
Seeds — flaxseed or linseed		1,447,831
Silk dress and piece goods	16,021,395	
Hosiery	149,644	
Other manufactures	7,025,821	23,196,860
Soda, carbonate of (131,650,949 lbs.)		1,769,419
Soda, caustic		808,033
Spices of all kinds (14,230,191 lbs.)		1,558,704
Straw and palm-leaf, manuf. of		2,428,299
Sugar, brown (1,169,668,086 lbs.)	46,036,754	
Molasses (12,094,716 galls.)	2,292,038	
Melado (48,907,074 lbs.)	1,390,200	49,718,992
Tin in plates (1,416,834 cwt.)		5,803,147
Tobacco, leaf (5,937,152 lbs.)	3,036,063	
Cigars (581,212 lbs.)	2,157,991	5,194,054
Watches, and watch materials		899,068
Wines, spirits, and cordials —		
Spirits and cordials, in casks (730,842 galls.)	875,076	
Spirits and cordials, in bottles (54,364 doz.)	313,843	
Wine, in casks (2,315,486 galls.)	1,273,880	
Wine, in bottles (211,970 doz.)	1,689,498	4,152,297
Wood, cabinet ware, and house furniture		586,469
Wool of all kinds, unmanufactured (17,660,397 lbs.)	2,159,824	
Cloths and cassimeres	5,436,134	
Shawls	1,150,560	
Dress goods	9,869,603	
Other manufactures	2,592,854	21,208,975

EXPORTS.

Agricultural implements		2,610,829
Animals, living		2,340
Horned cattle	2,340,997	
Horses	639,282	2,980,279
Books, maps, etc.		530,013
Breadstuffs —		
Indian corn (30,981,052 bush.)	15,673,697	
Oats (2,901,701 bush.)	931,241	
Rye (3,993,415 bush.)	2,596,331	
Wheat (55,485,183 bush.)	60,197,408	
Wheat flour (3,236,292 bbls.)	16,899,547	
Other small grains, pulse, farina, etc.	1,689,359	97,987,583
Carriages, and parts of		728,643
Clocks, and parts of		880,647
Copper, pigs, bars, sheets, and old (17,155,589 lbs.)		2,743,237
Cotton, unmanufactured (347,986 bales)	18,289,451	
Manufactured (97,848,422 yds.)	7,308,127	25,597,578
Drugs, chemicals, and medicines		1,822,203
Dyestuffs		569,413
Fruits, dried apples (6,166,242 lbs.)	246,653	
Green or ripe apples (575,649 bush.)	549,927	796,580
Fur and fur skins		4,048,812
Gold and silver bullion and coin		11,020,727
Hemp, manufactures of		1,168,568
Hides and skins		588,900
Hops (4,874,832 lbs.)		637,955
Iron and steel manufactures —		
Steam-engines, locomotives	460,579	
Machinery	2,460,952	
Other manuf. of iron	2,533,696	
Edge tools	823,590	
Fire-arms	617,207	6,896,024
Leather, sole, upper, and all other (24,867,947 lbs.)		5,026,667
Naval stores, resin, and turpentine (242,679 bbls.)	553,504	
Oil-cake (172,318,445 lbs.)	2,717,783	3,271,287
Oils — mineral, crude (17,716,883 galls.)	1,517,701	
Naphthas (11,477,029 galls.)	987,145	
Mineral, illuminating (206,520,009 galls.)	23,088,504	
Lard (1,465,958 galls.)	788,941	

Whale and other fish (1,436,984 galls.)	$489,394	$
Cotton-seed (2,093,519 galls.)	913,191	27,785,576
Paper and stationery		828,254
Provisions —		
Bacon and Hams (511,909,924 lbs.)	36,380,196	
Beef, fresh (44,414,227 lbs.)	4,043,929	
" salted or cured (27,048,507 lbs.)	1,820,886	
Butter (32,031,365 lbs.)	4,428,995	
Cheese (131,852,419 lbs.)	11,779,428	
Lard (249,358,426 lbs.)	17,480,387	
Meats, preserved	6,972,479	
Pork (49,962,536 lbs.)	2,798,604	85,704,904
Seeds, clover, timothy, etc		1,590,595
Sewing-machines, and parts of		1,473,486
Spirits, from grain (6,985,734 galls.)		2,189,760
Starch (12,766,490 lbs.)		529,217
Sugar, refined (41,055,403 lbs.)		3,491,139
Tallow (70,823,575 lbs.)		4,949,887
Tobacco, leaf (172,620,786 lbs.)	12,840,945	
Other manufactures	2,498,484	15,339,429
Wood, boards, deals, etc. (M. ft. 34,040)	627,833	
Shooks, staves, and headings	1,102,696	
Other timber	602,220	
Household furniture	1,110,884	
Other manufactures of wood	1,109,175	6,552,808

The extraordinary improvements which took place during the year 1879 in the trade of domestic *dry goods*, and particularly in woollens, cloths, and cassimeres, only increased, to a very small extent, the importation of foreign fabrics, as will appear by the statistics below. The scale of European fabrics suitable for the markets of the U. States has become more and more limited, on account of the improvements successively taking place here, aided by enormous duties on foreign merchandise. However, the products of manufactured goods in America being not equal to the demand, and the prices of these having greatly increased, large importations, principally of woollens suitable for the clothing-trade, have been lately made, and will continue until our domestic woollens are more plenty, or until they recede in price. The imports of dry goods into the port of *N. Y.* for 10 years from 1870 to 1879, were as follows: —

Years.	Value.	Years.	Value.
1870	$109,498,523	1875	$99,816,025
1871	132,480,777	1876	80,716,163
1872	136,831,612	1877	77,756,778
1873	114,160,465	1878	74,863,197
1874	106,520,453	1879	91,549,600

The imports of dry goods for the years 1877, 1878, and 1879, classified as to their manufactures, were as follows: —

Description of Goods.	Value, 1877.	Value, 1878.	Value, 1879.
Manufactures of wool	$19,422,130	$17,956,938	$20,773,785
" cotton	16,342,974	15,491,523	18,813,862
" silk	22,245,143	22,046,631	29,129,588
" flax	12,544,395	12,152.893	14,706,100
Miscellaneous dry goods	7,202,136	7,215,212	8,126,265
Total imports	$77,756,778	$74,863,197	$91,549,600

Internal trade and Manufactures. The domestic trade of *N. Y.* is immense, by far exceeding the foreign, but on this only partial, and not always reliable, information is obtainable. It is carried on by means of the numerous lines of railroads, the Hudson River, the Erie Canal, and the coasting steamers. The demand of the whole country for foreign goods and most of the products of domestic manufacture is, to a great extent, supplied by the *N. Y.* importers, jobbers, and commission merchants. There are several powerful organizations of business men to develop and regulate the foreign and domestic trade of the port, foremost among which are the Chamber of Commerce, whose beneficial influence is felt far beyond the limits of the city, the Board of Trade and Transportation, the Produce Exchange, the Cotton Exchange, etc. — The manufactures of *N. Y.* are only inferior to its mercantile interests; they are of considerable importance and very varied. Their statistics, when available, are given under the name of each branch of industry. The capital invested in manufactures at the present time is about $300,000,000, and the value of their products certainly exceeds $700,000,000.

Banks. On Jan. 1, 1880, there were in *N. Y.* 47 national banks. Their comparative resources and liabilities on Jan. 1, 1879 and 1880, were as follows: —

Resources.	January 1, 1879. 47 Banks.	January 1, 1880. 47 Banks.
Loans and Discounts	$164,649,453 43	$205,655,286 79
Bonds for Circulation	23,855,000 00	27,268,500 00
Bonds for Deposits	42.349,450 00	1,120,000 00
U. States bonds on hand	8,037,250 00	7,740,000 00
Other Stocks and Bonds	8,065.314 39	7,518,331 60
Due from National Banks	13,891,295 58	13,760,549 66
Due from State Banks	3,158,600 21	3,022,804 90
Real Estate, etc	9,597,506 11	9 865,356 06
Current Expenses	262,817 12	1,704,121 66
Premiums paid	1,378,120 46	769,604 23
Cash items	2,412,519 45	1,657,667 26
Clearing-house Exchanges	80,772,950 40	90,108,102 01
Bills of other Banks	2,551,500 00	1,421,996 00
Fractional Currency	62,783 98	52.311 07
Specie	18,161,092 49	49,646,389 64
Legal Tender Notes	16,351,562 00	7,653,513 00
U. States Certificates of Deposit	18,695,000 00	2,310,000 00
Due from U. States Treasurer	1,428,496 89	1,351,197 02
Total Resources	415,680,712 51	432,625,730 90
Liabilities.		
Capital Stock	51,250,000 00	50,650,000 00
Surplus Fund	15,898,610 84	16,560,184 84
Undivided Profits	6,772,172 54	10,228,317 51
National Bank Circulation	20,103,117 00	23,897,877 00
State Bank Circulation	73,705 00	53,525 00
Dividends unpaid	1,202,932 73	150,495 80
Individual Deposits	195.632,823 38	224,069,119 78
U. States Deposits	42,095,890 02	273,202 83
Deposits of U. States Disbursing Officers	210,539 98	277,297 77
Due to National Banks	61,109,208 73	78,356,030 93
Due to State Banks	21,323,712 29	28,109,679 44
Bills payable	8,000 00	....
Total Liabilities	$415,680,712 51	$432,625,730 90

The following statement exhibits the condition of the State banks, 22 in number, on March 15, 1879, and January 1, 1880: —

Resources.	March 15, 1879. 22 Banks.	January 1, 1880. 22 Banks.
Loans and Discounts, less due from Directors	$31,094,330	$35,195,039
Due from Directors	1,697,159	1,837,846
Overdrafts	14,904	35,097
Due from Trust Companies, State, National, and Private Banks, and Brokers	2,688,664	3,456,468
Real Estate	1,570,249	1,514,129
Bonds and Mortgages	34,567	48,648
Stocks and Bonds	3,752,072	2,841.193
Specie	1,339,182	3,554,577
U. S. Legal Tender Notes, and Circulating Notes of National Banks	4,401,280	3,001,601
Cash Items	6,487,994	10,738,056
Loss and Expense Account	154,156	405,108
Assets not included in either of the above heads	55,096	102,013
Add for Cents	62	63
Total Resources	53,289,715	62,729,838
Liabilities.		
Capital	11,975,200	11,825,200
Surplus Fund	2,869,778	2,948,596
Undivided Profits	1,727,657	2,250,249
Circulation	18,268	18,087
Due Depositors on demand	32,512,093	40,062,370
Due to Trust Companies, State, National, and Private Banks, and Brokers	3,696,944	5,210,799
Due Individuals and Corporations other than Banks and Depositors	237,719	203,220
Due Treasurer of the State of New York	115,601	99,360
Amount due, not included in either of the above heads	136,431	111,925
Add for Cents	24	32
Total Liabilities	$53,289,715	$62,729,838

The number of savings banks, the amount of deposits, the number of depositors, and the average due each depositor, on

the 1st of Jan. of each of the 10 years from 1871 to 1880 are shown in the following statement: —

Years.	No. of Banks.	Deposits.	Depositors	Average due each Depositor.
1871.....	42	$140,394,715	416,180	$337 34
1872.....	41	161,106,592	446,824	360 55
1873.....	41	169,503,273	470,417	360 32
1874.....	44	170,998,796	479,102	356 92
1875.....	44	180,010,703	494,086	364 33
1876.....	40	184,188,216.	468,652	393 02
1877.....	34	179,116,255	459,055	390 18
1878.....	28	176,261,335	457,775	385 03
1879.....	25	165,308,239	424,102	389 78
1880.....	25	175,380,743	455,380	385 13

Besides the above national and State banks, and 10 trust companies with a paid-in capital of $11,318,000, there is in *N. Y.* a considerable number of private banking-houses, some of them very powerful and influential, whose aggregate business exceeds by far that of the public banks.

Public Debt. The following statement, compiled from the annual report of the Comptroller of the City, exhibits the public debt of the city of *N. Y.* on the 1st of Jan., 1880, compared with the previous six years: —

Funded Debt	$123,145,333 66
Temporary Debt (Assessment Bonds).........	13,262,100 00
Revenue Bonds, Special.....................	33,466 41
Revenue Bonds of 1878.....................	1,650,000 00
" " 1879.....................	4,356,500 00
Total Bonded Debt.......................	142,447,400 07
Deduct Sinking Fund.....................	33,021,985 70
Total net bonded indebtedness, Dec. 31, 1879	109,425,414 37
" " " " 1878	113,418,403 49
Decrease in net bonded indebtedness during the year 1879	3,992,989 12
Total net bonded indebtedness, Dec. 31, 1877	117,700,742 30
" " " " 1876	119,811,310 39
" " " " 1875	116,773,724 09
" " " " 1874	114,979,969 99
" " " " 1873	107,028,471 07

Real and Personal Estate. The assessed value of real and personal estate of the city and county of *N. Y.*, from the year 1863 to 1879, was as follows: —

Years.	Real Estate.	Personal Estate.	Total Value.
1863	$402,196,652	$192,000,161	$594,196,813
1864.....	410,674,635	223,920,405	634,595,040
1865	427,404,384	181,423,471	608,827,855
1866.....	478,994,934	257,994,974	736,989,908
1867.....	555,442,062	275,152,651	830,594,713
1868.....	623,235,305	284,580,224	907,815,529
1869.....	684,183,918	291,142,696	975,326,614
1870.....	742,103,075	305,285,374	1,047,388,449
1871.....	769,306,410	306,947,223	1,076,253,633
1872.....	797,148,665	206,949,422	1,004,098,087
1873.....	836,691,980	292,447,643	1,029,139,623
1874	881,547,995	272,481,181	1,154,029,176
1875.....	883,643,545	217,300,154	1,100,943,699
1876.....	892,428,165	218,626,178	1,111,054,343
1877.....	895,063,933	206,028,160	1,101,092,093
1878.....	900,855,700	197,532,075	1,098,387,775
1879.....	918,134,380	175,934,955	1,094,069,335

Commissions. The following are the rates of commissions recommended by the Chamber of Commerce of *N. Y.*, Jan 8, 1857 (and still in force), to be charged where no express agreement to the contrary exists: —

Banking.

On purchase of stocks, bonds, and all kinds of securities, including the drawing of bills for the payment of same..............................	1	per cent
On sale of stocks, bonds, and all kinds of securities, including remittances in bills and guaranty	1	"
On purchase of sale of specie and bullion.........	½	"
Remittances in bills of exchange..................	½	"
Remittances in bills of exchange, with guaranty..	1	"
Drawing or indorsing bills of exchange..........	1	"
Collecting dividends on stocks, bonds, or other securities....................................	½	"
Collecting interest on bonds and mortgages.......	1	per cent.
Receiving and paying moneys on which no other commission is received........................	½	"
Procuring acceptance of bills of exchange payable in foreign countries..........................	¼	"
On issuing letters of credit to travellers, exclusive of foreign bankers' charge....................	1	"

Where bills of exchange are remitted for collection, and returned under protest for the non-acceptance, or non-payment, the same commissions are to be charged as though they were duly accepted and paid.

General Business.

For sales of foreign merchandise.................	5	"
On domestic merchandise........................	2½	"
Guaranty.......................................	2½	"
On purchase and shipment of merchandise, on cost and charges, with funds in bond..........	2½	"
Collecting delayed and litigated accounts.........	5	"
Effecting marine insurance, on amount insured...	½	"
No amount to be charged for effecting insurance on property consigned.		
Landing and re-shipping goods from vessels in distress, on value of invoice......................	2½	"
Landing and re-shipping, on specie and bullion...	½	"
Receiving and forwarding merchandise entered at custom-house, on invoice value 1 per cent, and on expenses incurred............................	2½	"
On consignments of merchandise withdrawn or re-shipped, full commissions are to be charged, to the extent of advances or responsibilities incurred, and one half commission on the residue of the value.		
On giving bonds that passengers will not become a burden on the city, on the amount of the bonds	2½	"

The risk of loss by robbery, fire (unless insurance be ordered), theft, popular tumult, and all other unavoidable occurrences, is in all cases to be borne by the owners of the goods, provided due diligence has been exercised in the care of them.

Shipping.

On purchase or sale of vessels	2½	"
Disbursements and outfit of vessels..............	2½	"
Procuring freight and passengers for Europe, East Indies, and in American vessels	2½	"
Do do. in foreign vessels............	5	"
Do. do. coastwise	5	"
Collecting freight..	2½	"
Collecting insurance losses of all kinds...........	2½	"
Chartering vessels, on amount of freight, actual or estimated, to be considered as due when the charter-parties are signed.....................	2½	
But no charter to be considered binding till a memorandum, or one of the copies of the charter, has been signed.		
On giving bonds for vessels under attachment in litigated cases, on amount of liability..........	2½	"

The foregoing commissions to be exclusive of brokerage, and every charge actually incurred.

Storage. The rates of storage and labor chargeable on unclaimed goods, at U. States private bonded warehouses, approved by the Chamber of Commerce, and now in force, are as follows: —

	Storage. *Cts.*	Labor. *Cts.*	Storage. *Cts.*	Labor. *Cts.*
Ale or porter, in hhds.........	20	20		
Ale or porter (bottles), in barrels	8	8		
Ale or porter (bottles), in casks.	15	15	to 20	20
Alcohol, in puncheons.........	30	30	to 40	40
Anvils, loose..................	4	4		
Anvils, in casks	30	30	to 40	40
Antimony, in casks...........	20	20	to 30	30
Almonds, in frails............	4	4	to 6	6
Almonds, in bales............	10	10	to 20	20
Almonds, in casks............	10	10	to 15	15
Almonds, in bags.............	4	4		
Argols, in casks..............	20	20	to 30	30
Arrow-root, in kegs (Bermuda)	5	5	to 8	8
Balsam Copaiba, in tin cans....	6	6		
Balsam Copaiba, in barrels.....	15	15	to 25	25
Balsam Copaiba, in hhds.......	30	30	to 40	40
Bark (Peruvian), in bags	4	4		
Bark (do.), in ceroons....	5	5	to 10	10
Beads (Trieste), in cases	10	10	to 20	20
Beer, in bbls	10	10		
Beer, in hhds.................	20	20		
Beeswax, in bales	10	10	to 20	20
Blankets, in bales............	30	30		
Blankets, in trusses, 2 bales each	30	30	to 40	40

	Storage. Cts.	Labor. Cts.	Storage. Cts.	Labor. Cts.
Boots and shoes, in cases	10	10	to 15	15
Bottles, in hampers	25	25		
Bottles, in crates	20	25		
Borax, in casks	10	10	to 20	20
Borax, in cases	5	5		
Brandy, in pipes	35	35		
Brandy, in half pipes	25	25		
Brandy, in quarter casks	12½	12½		
Brandy, in eighth casks	6¼	6¼		
Burlaps, in bales	30	30	to 50	50
Butter, in kegs	3	3	to 5	5
Cassia, in mats (for 100 mats)	25	25		
Cassia, in chests	5	5	to 8	8
Cassia, in rolls or bales	8	8	to 10	10
Camphor, in cases	5	5	to 8	8
Capers, in boxes	1½	1½	to 3	3
Carboys (Vitriol, etc.)	20	20	to 50	50
Canvas, in bolts	3	3		
Cantharides, in cases	10	10	to 20	20
Candles, in boxes	2	2	to 6	6
Camomile Flowers, in bales	10	10	to 20	20
Carpets, in rolls (single)	8	8	to 10	10
Carpets, in cases	25	25	to 30	30
Carpets, in bales	30	30	to 40	40
Cheese, in boxes (Dutch)	8	8	to 10	10
Cheese, in casks	15	15	to 25	25
Chicory, in casks	15	15	to 20	20
Champagne, in baskets	3	3		
Champagne, in cases	3	3		
Chocolate, in casks	15	15		
Chocolate, in cases	2	2	to 3	3
Chain Cables, per ton	37½	75		
Citron, in cases	10	10	to 20	20
Cloves, in bags	4	4	to 8	8
Cloths, in bales	20	20	to 30	30
Cloths, in cases (Eng.)	20	20	to 30	30
Cocoa, in bags	4	4	to 8	8
Cochineal, in ceroons	6	6	to 10	10
Codfish (dry), per quintal	4	5		
Coffee, in bags	3	3	to 4	4
Crockery, in crates	30	30	to 40	40
Crockery, in casks	30	30	to 40	40
Crockery, in cases	20	20	to 30	30
Cordials, in cases of 1 doz	2½	2½	to 3	3
Cordials, in hhds.	15	15	to 20	20
Cordials, in puncheons	30	30	to 40	40
Corks, in bales	10	10	to 20	20
Corkwood, in bundles or bales	5	5	to 15	15
Copper, in pigs, per 2,000 lbs.	25	40		
Copper, in sheets, per ton	35	35		
Copperas, in casks	20	20	to 40	40
Cubebs, in bales	10	10	to 20	20
Currants, in bbls	5	5	to 6	6
Currants, in carrotels	20	20		
Cream of Tartar, in casks	20	20	to 40	40
Cinnamon, in rolls or bales	8	8	to 15	15
Cigars		See Segars.		
Dates, in frails	10	10		
Demijohns (empty), 5 gals.	1½	1½		
Demijohns (empty), 3 gals.	1	1		
Demijohns (empty), under 3 gals.	¾	1		
Dry Goods (cottons), in cases; Dry Goods (linens), in cases; Dry Goods (hosiery), in cases; Dry Goods (hdkfs.), in cases; Dry Goods (gloves), in cases	15	20	to 25	30
Dry Goods (woollen hosiery), casks	20	20	to 30	30
Dundee linens, bales, all sizes, average	30	30	to 40	40
Dunnage mats, each	½	½		
Earthenware		See Crockery.		
Emery, in kegs	4	4		
Figs, in drums	½	½		
Figs, in frails	5	5		
Filberts, in bags	5	5	to 10	10
Flour, in bbls.	4	4		
Flour (sago), in bags	3	3		
Fish (cod), per quintal	4	5		
Fish (herrings), in kegs	2	2	to 5	5
Fish (mackerel), in bbls.	8	8		
Fish (mackerel), in ½ bbls	4	4		
Furs, in casks	20	20	to 35	35
Furs, in cases	20	25	to 25	25
Furs, in bales	15	15	to 30	30
Flocks, woollen, in bales	20	20	to 25	25
Flax, in bales	20	20		
Felt, in bales	20	20	to 25	25
Fustic, per ton	25	30		
Gamboge, in cases	8	8	to 10	10
Gin, in pipes	35	35		
Gin, in ¾ pipes	30	30		
Ginger, in bags	4	4		
Ginger (East India), in cases	4	4	to 10	10
Gum arabic, in cases	10	10	to 15	15
Gums, in sacks	20	20	to 25	25
Gunny-bags, in bales (2 bush. bags)	10	10		
Gunny-bags, in bales (3 bush. bags)	15	15		
Gunny-bags, in bales (4 bush. bags)	20	20		
Guns, in cases	15	20	to 20	25
Glue, in casks	20	20	to 30	30
Gutta-percha, loose, per 100 ps. aver.	30	30	to 50	50
Glass (window), in boxes	2	2	to 4	4
Glass (plate), in cases	20	20	to 50	50
Hardware, in casks	30	30	to 50	50
Hats (Maracaibo), in ceroons	12½	12½	to 20	20
Hats (Maracaibo), in cases	12½	12½	to 20	20
Hats (Panama), in cases	12½	12½	to 20	20
Hats (Panama), in ceroons	12½	12½	to 20	20
Hides (ox), loose, each	1	1		
Hides (deer), in bales	15	15	to 25	25
Hides (do.), in bundles	15	15	to 25	25
Hemp (Manilla), in bales	5	5		
Hemp (Italian), in bales	10	10	to 20	20
Hemp, loose, per ton	100	75		
Hops, in bales	15	15	to 20	20
Hops, in bales, compressed	8	8	to 10	10
Hosiery (woollen), in casks	20	20	to 40	40
Indigo, in ceroons	5	5	to 10	10
Indigo, in cases	10	10	to 15	15
Iron, in bars, per ton	25	37½		
Iron, in rods, do.	25	37		
Iron, in sheets, do.	25	37½		
Iron, hoop, in bdls., per bdl. of 56 lbs	1	1		
Iron, hoop, in bdls., per bdl. of 112 lbs	2	2		
Iron, in pigs, per ton	25	37½		
Ipecac, in ceroons	5	5	to 10	10
Iron (railroad)	10	15		
Iron boiler-plates, per ton	25	40		
Iron rods, in coils, each	6	6	to 10	10
Iron wire, in mats	4	4	to 8	8
Jalap, in bales	8	8	to 15	15
Jews-harps, casks or cases	20	20	to 30	30
Kirschwasser, in cases 1 doz	2½	2½	to 3	3
Kirschwasser, in hhds.	20	20		
Laces, in cases	15	15	to 20	20
Lard, in kegs	3	3	to 5	5
Lead, in pigs, per ton of 2,000 lbs.	20	30		
Lead, in sheets, or in rolls, per ton	50	75		
Lead pipes, in cases	30	30		
Lithographic stones, in cases	25	25	to 50	50
Liquorice paste, in cases	8	8	to 10	10
Liquorice sticks, in cases	8	8		
Liquorice root, in bundles	5	5		
Liquorice root, in bales, each	8	8		
Linens (Dundee), in bales, average	30	30	to 40	40
Linens, in cases	15	15	to 30	30
Looking-glass plates, in cases	20	20	to 50	50
Logwood, per ton	25	30		
Lignumvitæ, per 2,000 lbs.	20	30		
Macaroni (Italian), in cases	4	4	to 6	6
Macaroni (French), in cases	3	3	to 4	4
Madder (French), in casks	50	50	to 75	75
Madder (German), in casks	35	35	to 40	40
Magnesia, in cases	10	10	to 20	20
Manna, in cases	10	10	to 20	20
Marbles, in casks	25	25	to 30	30
Matting (East India), in rolls, ¾ yds	3	3		
Matting (East India), in rolls, 4-4ths	4	4		
Matting (East India), in rolls, 5-4ths	5	5		
Mustard, in cases	3	3	to 5	5
Musical instruments, in cases	30	30	to 50	50
Nails, in kegs	2	2		
Nails, in bags	2	2		
Nut-galls, in bags	3	3	to 3	4
Nutmegs, in cases	8	8	to 10	10
Nutmegs, in bbls	10	10		
Nutmegs, in casks	20	20	to 25	25
Ochre, in casks	15	15	to 25	25
Oil (olive), in cases	2	2	to 3	3
Oil (do.), in baskets	1½	2	to 2	3
Oil (do.), and other, in casks	15	15	to 30	30
Oil (essence), in cases	6	6	to 10	10
Oil of Vitriol		See Carboys		

	Storage. Cts.	Labor. Cts.	Storage. Cts.	Labor. Cts.
Olives, in cases	2	2		
Olives, in jars	1	1		
Olives, in kegs	2	2		
Opium, in cases	10	10	to 20	20
Paints, in barrels	10	10	to 15	15
Paints, in kegs	5	5		
Paper, in bales	8	8	to 20	20
Paper, in cases	8	8	to 20	20
Paper cigars		See Segars.		
Peas (preserved), in cases	5	5		
Palm-leaf (Esteras)	4	4		
Palm-leaf. per bundle	1	1		
Pencils (lead), in cases	10	10	to 20	20
Pepper, in bags	3	3	to 4	4
Peruvian bark, in bags	4	4		
Peruvian bark, in ceroons	5	5	to 10	10
Pipes, in boxes	1	1		
Potash (hydriodate of), in cases	15	15	to 20	20
Prunes, in casks	15	15	to 20	20
Prunes, in bbls	6	6		
Prunes, in ½ bbls; Prunes, in ¼ bbls	2	2	to 3	3
Prunes (in paper), in cases	5	5	to 10	10
Prunes (in glass), in cases	8	8	to 10	10
Pimento, in bags	3	3	to 4	4
Pianos	100	200		
Quinine (bottles), in cases	6	6	to 12	12
Quicksilver, in flasks	5	5		
Raisins, in boxes	¾	1		
Raisins, in ½ and ¼ boxes	½	½		
Raisins, in kegs	3	3		
Raisins, in ½ kegs	2	2		
Rhubarb, in cases	6	6	to 20	20
Rum (Jamaica), in puncheons	35	35		
Rum (St. Croix), in puncheons	35	35		
Rum (bay), in puncheons	35	35		
Sardines (Guilloux), in cases	5	5		
Sardines (A. Camus), in cases	4	4		
Sago, in cases	8	8	to 10	10
Sarsaparilla (Honduras), in bales	8	8	to 10	10
Sago flour, in bags	3	3	to 4	4
Segars, in cases	20	20	to 50	50
Segars, loose, per box, all sizes	½	½		
Segars, in bbls. and paper, all sizes	8	8	to 10	10
Shot, in frails (of 8 bags)	10	10		
Silks (India), in cases	8	10		
Silks (English), in cases	20	20		
Silks (French), in cases	20	20		
Silks (Italian), in cases	20	20		
Silks (raw), in ceroons	8	8	to 10	10
Soap, in boxes	2	2	to 3	3
Straw goods, in cases	10	10	to 30	30
Steel (Milan), in boxes	4	4		
Steel (English), in cases	20	25	to 25	30
Steel, in bdls., per bdl.	3	3	to 4	4
Skins (deer), in bales	15	15	to 20	20
Spelter, in plates, 2,000 lbs.	20	37½		
Sugar (Manilla), in bags	2½	5½	to 3	3
Sugars (Brazil), in bags	3	3	to 4	4
Sugar (Dutch), in tierces	15	20	to 25	30
Sugar (raw), in hhds	30	30	to 35	35
Sugar, in boxes	8	10	to 10	10
Suspenders, in cases	10	10	to 20	20
Tea, in chests	4	4		
Tin plates, in boxes	1½	2	to 2	2
Tin (Banca), per 2,000 lbs	20	37½		
Tonqua beans, in casks	10	10	to 20	20
Toys, in cases, Toys, in casks, average	25	25	to 30	30
Twine, in bales	10	10	to 30	30
Tobacco, in ceroons or bales	4	4	to 6	6
Tobacco, in cases	10	10	to 20	20
Valerian, in bales	10	10	to 25	25
Vermicelli (Italian), in cases	4	4	to 6	6
Vermicelli (French), in cases	3	3	to 4	4
Vinegar, in hhds	20	20		
Vinegar, in bbls	10	10		
Watches and jewelry, per case	35	50		
White lead, in kegs	2	2		
Whiskey, in puncheons	40	40		
Wine, in butts	40	40		
Wine, in pipes	35	35		
Wine, in ½ pipes	15	15		
Wine, in ¼ pipes	7	7		
Wine, in ⅛ pipes	5	5		
Wine (claret), in cases, 1 doz.	2½	2½		
Wine (hock), in cases, 1 doz.	3	3		
Wine (hock), in cases, 2 doz.	5	5		
Wine (claret and Sauterne), in hhds.	20	20		
Woollens, in casks	20	20	to 40	40
Woollens, in bales	20	20	to 40	40

	Storage. Cts.	Labor. Cts.	Storage. Cts.	Labor. Cts.
Wool, in bales	15	15	to 30	30
Zinc, in pigs or plates, per ton, 2,000 lbs.	25	37½		
Zinc, in casks	20	20	to 30	30

Articles not enumerated, at rates to correspond with those allowed for packages of similar size, or property of like general description. Such as are of unusual weight or size, as compared with enumerated articles, to be charged a reasonable compensation for labor and for storage according to space occupied, as compared with rates allowed for other storage.

All packages of ordinary and usual size to be charged at rates not exceeding those specified in the first columns of prices, to wit, the lowest rates. The higher rates indicated in the second columns are intended to apply only to packages of more than ordinary size or weight.

The rates for labor include both receipt and delivery of goods. The rates for storage are per month. If goods are taken from store at any time during the first month, one month storage chargeable; after the first, to be computed by the half-month.

All questions as regards the rates, or disputes between the warehouse proprietor and importer on any of these points, to be decided by arbitration

Cartage. The city ordinances regulating the rates of cartage to be charged in the city of *N. Y.* are as follows: —

The prices or rates to be taken or charged for the loading, transportation, and unloading of goods, wares, or other articles, shall be as follows, to wit: —

Oils, molasses, and all wet casks containing less than 25 gallons.	
Of 25 gallons, and under 50 gallons.	
Of 50 gallons, and under 100 gallons.	
For 100 gallons and upward	
All gaugeable goods ⅜ of a cent per gallon.	
Sugars, tobacco, copperas, and all dry casks, of under 1,000 lbs weight, for every load	$0 75
Of 1,000 lbs., and under 1,500 lbs., each	86
Of 1,500 lbs., and under 2,000 lbs., each	93
Of 2,000 lbs., and upward, for every 100 lbs., and other ponderous articles of 1,000 lbs. weight and upward, at the same rate	11
Hay, loose, per load	1 68
Bricks, when handled and piled, per load	86
Hoop-poles, loose, per load	98
Timber and lumber, per load	71
Hemp, loose, for every 1,200 lbs.	93
Beef and pork, for every 5 barrels	75
Calves, sheep, and lambs, per load	71
Coal, per ton	93
Coal, per half-chaldron	73
Cotton, for every 3 bales	75
Earthenware, loose, per load	78
Oil floor-cloths, in boxes or rolls of less than 10 feet in length, per load	68
Of 10 feet, and less than 15 feet in length, each	68
Of 15 feet, and less than 20 feet in length, each	93
Of 20 feet, and less than 24 feet in length, each	1 16
Of 24 feet and upward, as may be agreed on.	
Plaster of Paris, loose, per ton	1 16
Salt, for every 20 bushels	68
Cut stone, per load	71
Slates or tiles, per load	71
Household furniture, loose, per load	95
For loading, unloading, and housing furniture, in the removal of families, extra, per load	93
Bedding, tied up, chests, trunks, and boxes, per load	75
Cassia, in mats, per 100 mats	50
Anchors of under 300 lbs. weight, per load	75
Anchors of 300 lbs. weight and upward, per 100 lbs.	18
Chain cables of under 1,000 lbs. weight, per load	78
Of 1,000 lbs. weight and upward, per 100 lbs	11
Iron hollow-ware, per load	78
Iron and steel, per load	66
Fish, dry, per load	93
And for every load of goods, wares, and merchandise, or other things not enumerated	75

All goods shipped in bond, double cartage. — When the distance exceeds half a mile, and is within a mile, one third more shall be added to the above rates and prices, and in proportion for any greater distance And if any public cartman shall ask, demand, receive, take, exact, or extort any greater rate, price, pay, or compensation for carting or transporting any article or thing whatsoever than is mentioned, allowed, expressed, and limited as aforesaid, it shall not be lawful for him to receive any compensation for the said carting or transportation; and the said asking or receiving shall be deemed a violation of this chapter — Public porters shall be entitled to charge and receive for the carrying or conveyance of any article, any distance within half a mile, twenty-five cents if carried by hand, and fifty cents if carried on a wheelbarrow or handcart; if the distance exceeds half a mile and is within a mile, one half of the above rates in addition thereto, and in the

same proportion for any greater distance. — If any public porter shall ask or demand any greater rate of pay or compensation for the carrying or conveyance of any articles than is herein provided, he shall not be entitled to any pay for said service; and to so ask, demand, or receive any greater pay or compensation, shall be deemed a violation of this chapter.

Pilotage. The following are the rates of pilotage at the port of N Y, as established by act of the legislature *: —

From April 1 to November 1.†

Feet and inches.	Inward.				Outward.	
	Rate.		Off shore	Total.	Rate.	
6	$3.70	$22.20	$5.55	$27.75	$2.70	$16.20
6.6	3 70	24.05	6 01	30.06	2.70	17.55
7	3.70	25.90	6 48	32.38	2.70	18.90
7 6	3 70	27.75	6.94	34.69	2.70	20.25
8	3.70	29 60	7 40	37.00	2.70	21 60
8.6	3.70	31.45	7 86	39.31	2.70	22.95
9	3 70	33.30	8.33	41.63	2 70	24 30
9 6	3 70	35.15	8.79	43.94	2.70	25 65
10	3 70	37.00	9.25	46.25	2.70	27.00
10 6	3 70	38.85	9 71	48.56	2 70	28.35
11	3 70	40 70	10.17	50.87	2 70	29.70
11 6	3.70	42.55	10.64	53.19	2.70	31.05
12	3.70	44 40	11.10	55.50	2 70	32 40
12.6	3 70	46.25	11.56	57.81	2.70	33.75
13	3.70	48.10	12.02	60.12	2.70	35.10
13 6	3 70	49.95	12.49	62 44	2.70	36 45
14	4.50	63.00	15.75	78.75	3.10	43 40
14.6	4.50	65.25	16.31	81 56	3.10	44 95
15	4.50	67 50	16.87	84.37	3.10	46.50
15 6	4.50	69 75	17.43	87.18	3.10	48.05
16	4 50	72.00	18.00	90.00	3 10	49.60
16.6	4 50	74.25	18.56	92 81	3 10	51.15
17	4.50	76.50	19.12	95.62	3 10	52.70
17 6	4.50	78 75	19.69	98.44	3.10	54 25
18	5.50	99 00	24.75	123.75	4.10	73.80
18 6	5 50	101.75	25.44	127.19	4.10	75.85
19	5.50	104.50	26 12	130 62	4.10	77.90
19 6	5.50	107.25	26.81	134.06	4.10	79.95
20	5.50	110.00	27.50	137.50	4 10	82.00
20.6	5.50	112.75	28.19	140.94	4.10	84.05
21	6.50	136.50	34.12	170.62	4.75	99.75
21.6	6.50	139 75	34 94	174.69	4.75	102.12
22	6 50	143.00	35.75	178.75	4.75	104.50
22.6	6.50	146 25	36.56	182.81	4.75	106.87
23	6.50	149 50	37.37	186.87	4.75	109.25
23.6	6.50	152 75	38.19	190.94	4.75	111.62
24	6.50	156 00	39.00	195.00	4.75	114.00
24.6	6 50	159 25	39 81	199.06	4.75	116.37
25	6.50	162.50	40.62	203.12	4.75	118.75

Transportation North to East River, and vice versa, $5.

Pilotage from quarantine, one quarter of the inward pilotage, exclusive of off shore. Hauling to or from wharf, $3; detention, $3 per day.

PILOTAGE FOR TAKING VESSELS FROM THE OLD TO THE NEW QUARANTINE.

For vessels having had death or sickness on board, double outward pilotage.

For vessels from sickly ports, but having had no sickness on board, single outward pilotage.

Pilotage of vessels from new quarantine to New York, half inward pilotage.

Pilotage of vessels from lower to upper quarantine, quarter pilotage.

Extract from the law passed as above in reference to unlicensed pilots: —

SEC 29. Any person not holding a license as pilot under this act, or under the laws of the State of New Jersey, who shall pilot, or offer to pilot, any ship or vessel to or from the port of New York, by way of Sandy Hook, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished by a fine not exceeding one hundred dollars, or imprisonment not exceeding sixty days; and all persons employing a person to act as pilot not holding a license under this act, or under the laws of the State of New Jersey, shall forfeit and pay to the Board of Commissioners of Pilots the sum of one hundred dollars.

New York and Boston Insurance Co., located in New York City, organized in 1876. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $20,068; premiums, $24,371.91. Premiums received since the organization of the Co., $113,710.25; losses paid, $62,711.94. Cash dividends paid to stockholders, $16,089.28.

New York and Canada R.R. runs from Whitehall to Rouse's Point, N. Y., 112.95 m.; branches, 36.98 m.; total, 149.93 m. This Co., whose office is in New York, was organized in 1873, and the road was completed in 1876. The line is leased to the Delaware and Hudson Canal Co. Cap. stock, $4,000,000; funded debt, first mortgage 6% bonds, due in 1904, $4,000,000. Cost of construction, $8,153,683.

New York and Harlem R.R. runs from New York City to Chatham, N. Y., where it connects with the Boston and Albany R.R., 126.96 m. This Co., whose office is at the Grand Central Depot, New York, was chartered in 1831, and the road, opened in 1852, was in 1873 leased for 401 years to the New York Central and Hudson River Co., which pays 8 per cent annual dividend on the stock, and the interest on the funded debt. The lease comprises the tract to 42d Street and the Grand Central Depot, but in it is not included the horse railroad on 4th Avenue, which is the property of the N. Y. and H. R. R. Co. Cap. stock, $9,050,000; funded debt, $10,617,329. Cost of construction, $17,096,143.

New York and New England R.R. runs from Boston, Mass., to Willimantic, Conn., 83.75 m.; branches, 53.25 m.; leased line (Rhode Island and Massachusetts R.R.), 14.12 m.; total length of line operated, 153.12 m. This Co., whose offices are in Boston, was formed in 1873 by the reorganization of the Boston, Hartford, and Erie R.R. Co., chartered in 1863, and successor of several lines, complete and incomplete, among them the Hartford, Providence, and Fishkill R.R., of which the N. Y. and N. E. R.R. Co. took possession in October, 1878, after redeeming the bonds of that Co. For this and other purposes, the Co. created a new mortgage on the property for $10,000,000, the bonds issued under this mortgage bearing interest at 7 per cent. Cap. stock, $5,817,000; bonds entitled to stock, $14,183,000; funded debt, $400,000; total, $20,400,000. Cost of road (Berdell bonds), $20,000,000; new construction and equipment, $612,533.

New York Bowery Fire-Insurance Co., located in New York City, organized in 1833. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $300,000; net surplus, $386,940.55; premiums, $161,688.50. Premiums received since the organization of the Co., $4,568,271.32; losses paid, $1,623,241.54; cash dividends paid to stockholders, $2,476,500.

New York Central and Hudson River R.R. runs from New York City to Buffalo, 441.75 m. Branches from Syracuse to Rochester, 104 m.; from Rochester to Niagara Falls, 74.75 m.; six other branches, 109.67 m.; total length of branches, 298.42 m. Leased lines, Niagara Bridge and Canandaigua R.R., 98.46 m.; New York and Harlem R.R., 126.96 m.; eight other lines, 52.68 m.; total length of leased lines, 278.10 m. Total length of all lines operated, 1,018.27 m. This powerful Co., organized in 1853, operates also under lease, but by separate account, the Dunkirk, Alleghany Valley, and Pittsburgh R.R. Cap. stock, $89,428,300; funded debt, $39,801,233.33; and bonds and mortgages on real estate, $632,050.56; total, $129,861,583.89. Cost of construction and equipment, $99,894,095.43. Dividends paid in 1879, 8 per cent. Address of the Co., Grand Central Depot, New York City.

New York City and Northern R.R. runs

* A bill abolishing compulsory pilotage, and reducing the above rates 33⅓ per cent, was pending in the legislature at the time of printing this table.

† The rates from Nov. 1 to April 1 are $4 additional on both inward and outward bound vessels: that is to say, a vessel drawing 6 feet pays $32.18 and $20 20, instead of $28.12 and $16.20.

from High Bridge to Brewster's, New York, 51.33 m. This Co., located in New York City, was organized in 1878, and acquired, under perpetual lien, the New York, Westchester, and Putnam R.R. Cap. stock, $1,275,500; funded debt, $500,000; total, $1,775,500, representing cost of road to present Co.

New York City Insurance Co., located in New York City, organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $300,000; net surplus, $1,065.05; premiums, $154,018.36. Premiums received since the organization of the Co., $952,045.36; losses paid, $504,621.58; cash dividends paid to stockholders, $95,000.

New York Equitable Insurance Co., located in New York City, organized in 1865. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $210,000; net surplus, $316,395.55; premiums, $46,192.30. Premiums received since the organization of the Co., $3,445,761.30; losses paid, $1,635,912.20; cash dividends paid to stockholders, $1,540,500.

New York Fire-Insurance Co., located in New York City, organized in 1865. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $130,185.82; premiums, $72,592.26. Premiums received since the organization of the Co., $3,078,942.26; losses paid, $1,814,927.96; cash dividends paid to stockholders, $1,286,000.

New York, Lake Erie, and Western R.R. runs from Jersey City, N. J., to Dunkirk, N. Y., 460.03 m. (of which 30.89 m. are leased); branches, 65.66 m.; lines leased or operated under contract (22 in number), 443.90 m.; total length of lines operated, 969.59 m. This Co. is the reorganization, in 1878, of the Erie Railway Co., which itself succeeded in 1861 the New York and Erie R.R. Co. Cap. stock, common (771,077 shares), $77,107,700; and preferred 7% (81,467 shares), $8,146,700; total, $85,254,400; funded debt, $69,318,203.69. Cost of road and equipment, $118,049,930.93. Address of the Co., 187 West Street, New York City.

New York Life-Insurance Co., located in New York City, organized in 1845. *Statement*, Jan. 1, 1880: Assets, $38,858,830.58; liabilities, $31,140,058.18; gross surplus, $7,698,772.40; new policies, 5,524, amounting to $17,098,173; policies in force, 45,705, amounting to $127,417,762; premiums, $5,865,239.28.

New York, New Haven, and Hartford R.R. runs from Williamsbridge, N. Y., to Hartford, Conn., 123 m.; branches, 17.50 m.; leased line (Harlem River and Portchester R.R.), 11.80 m.; total length of line operated, 152.30 m. The Co. operates also under lease the Shore Line R.R., but its accounts are kept separately. This Co. is the consolidation in 1872 of the New York and New Haven and the Hartford and New Haven R.R. Cos. Cap. stock, $15,500,000. Cost of construction and equipment, $15,044,039. Address of the Co., Grand Central Depot, New York City.

New York, Providence, and Boston R.R. runs from Providence, R. I., to Stonington, Conn., 50 m.; extension from Stonington to Groton, 12.50 m.; total length of line, 62.50 m. This Co., whose offices are in Stonington, was organized in 1833. Capital stock (authorized, $4,000,000), paid-in, $3,000,000; funded debt, $1,050,000. Cost of road and equipment, $3,204,508.

New Zealand, a British colony in the South Pacific Ocean, consisting of three islands, generally known as the Northern, Middle, and Stewart islands, situated about 1,200 m. E. of New South Wales, between lat. 34° 20′ and 47° 20′ S., lon. 166° 25′ and 178° 35′ E. The entire area is stated at 106,260 sq. m. (being a little smaller than Great Britain and Ireland), of which two thirds are fitted for agriculture and grazing. North Island is 500 m. long, with breadth varying from 5 to 300 m. South Island is 530 m. long, with an average breadth of 110 m. Stewart Island is triangular, and measures about 36 m. on each side. The population of *N. Z.* in March, 1878, was ascertained to be 414,412. The native population (Maories), in 1874, was estimated at 42,918 in addition, chiefly in the Northern Island. In 1840 a treaty was concluded at Waitangi with the native chiefs, whereby the sovereignty of the islands was ceded to Great Britain, while the chiefs were guaranteed the possession of their lands, forests, etc., so long as they desired to retain them; the right of pre-emption was, however, reserved to the Crown, if they wished to alienate any portion. Thus, *N. Z.* became a regular colony, and the seat of government was fixed at Auckland, but was removed to Wellington in 1865.

The coast-line of *N. Z.* is about 3,000 m. in length, of which about one half belongs to North Island. The best harbors of this island are in the north, between North Cape and Cape Colville, including Auckland and other excellent ports. South of Cape Colville, on the E. side, for the space of 200 m., there are only two safe anchorages, Mercury Bay and Tauranga, the former of which does not admit large vessels. On the remainder of the E. coast, for a distance of 400 m., there is no safe harbor except Wellington at the S. end of the island. On the W. coast of North Island the principal harbors are Manukua, Kaipara, and Hokianga, which are spacious and secure, but obstructed by sand-bars at the entrances. At the N. extremity of South Island are many extensive sounds and harbors with deep water; but along the whole of the E. coast, for 500 m., the only harbors are Akaroa, Victoria, and Otago. On the S. and S. W. sides of this island ports are numerous and excellent; and higher up on the W. side is Jackson's Bay, a safe anchorage. From Jackson's Bay northward, 300 m., the rest of the W. coast of South Island is open and exposed. In Stewart Island there are several safe harbors. *N. Z.* in many parts is very mountainous; a mountain chain traverses the W. side of the South Island, culminating in Mount Cork, 13,200 ft. in height. The climate is equable, pleasant, and salubrious; admirably adapted for raising every fruit, flower, and edible that flourishes in temperate countries. Amongst the productions most peculiar to *N. Z.* are the Kauri pine (found only at the northern extremity of the islands), much valued for ship-building, from its lightness and elasticity, the resin of this tree forming also one of its most valuable exports, Kauri gum; and the native flax, considerable quantities of which are transmitted to Great Britain for the manufacture of ropes. Wool is largely produced, forming, next to gold, by far the largest item in the exports. The mineral riches of the colony promise abundant returns when they have been more fully explored. Gold has been discovered in many districts, and the mines have proved to be among the richest in the world. Rich iron-ore, in the form of iron-sand, has been found in Taranaki. Coal is widely distributed, and copper is met with in several localities. The intercourse with the U. States was long chiefly confined to the visits of a few whalers, mostly at the Bay of Islands, a large, deep, and safe harbor near the N. extremity of North Island, on the southern side of which is the port and town of Russell, with a U. States consul. Our exports to *N. Z.* have, however, begun to assume some importance since the establishment of a line of American steamers from San Francisco to Auckland, which carry the mail by contract with the *N. Z.* government.

Auckland, a seaport city, formerly the capital of *N. Z.*, is finely situated on an isthmus in the N. W. peninsula of North Island, on the S. shore of the Waitemata harbor, which is formed by an inlet of the Hauraki Gulf, lat. 36° 51′ S., lon. 174° 50′ E. On the other side of the isthmus lies the harbor and town of Manukua, which serves as a supplementary port to the city. In 1878, 203 foreign vessels, with a tonnage of 64,167 tons, entered the port, besides a large number of coasting ships. There are registered at Auckland 182 sailing vessels and 22 steamers, most of them of local build. Pop. 21,000.

Wellington, a seaport city, the capital of *N. Z.*, is situated in the S part of North Island, in Cook's Strait, and on the W. shore of Port Nicholson. Its trade is rapidly increasing. The principal exports are wool, tallow, timber, and gum. Pop. 10,000.

Niagara Fire-Insurance Co., located in New York City, organized in 1850. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; net surplus, $517,458.15; premiums, $413,562.96. Premiums received since the organization of the Co.,

$11,110,761.96; losses paid, $6,307,002.60; cash dividends paid to stockholders, $1,519,001.

Nib, the handle of a scythe. — One of the points of a pen.

Nibo, a coarse powder used in some parts of India for washing silk, obtained from *Antichoris arabica.*

Nibu, the bruised, roasted seeds of the cacao, freed from husk and membrane.

Nicaragua, a republic of Central America, bounded N. by Honduras (from which it is separated by the river Coco), E. by the Caribbean Sea, S. by Costa Rica, and W. by the Pacific Ocean. It lies between lat. 10° 45′ and 14° 55′ N., and lon. 83° 15′ and 87° 38′ W.; area, 57,500 sq. m. The old capital of the republic is the city of Leon, 10 m. from the Pacific, surrounded by five active volcanoes, and partly in ruins. At present the seat of government is the town of Managua, situated on the S. border of the lake of that name, with 8,000 inhabitants. The legislative power is vested in a Senate of 10 members and a House of Representatives of 11 members. Both branches of the legislature are elected by universal suffrage. The executive power is with a president elected for 4 years. The population is estimated at 350,000 souls, giving an average of nearly seven inhabitants to the square mile. There are no census returns. The great mass of the population consists of aboriginal "Indians," Mulattoes, Negroes, and mixed races, and the number of Europeans and their descendants is very small and on the decrease. There are few towns, and the chief occupation of the inhabitants is the rearing of cattle, carried on in a rude fashion.

The surface of *N.* is much diversified. It is traversed by two mountain ranges, the western of which follows the direction of the coast-line, varying from 10 to 20 m. from the Pacific. The eastern range (a part of the great range of the Cordilleras) runs nearly parallel to it, sending off several spurs towards the Mosquito Territory (*q. v.*) and forming the immense basin which contains Nicaragua and Managua lakes. These mountains often attain an elevation of 11,000 ft. The country is in many districts densely wooded, the most valuable trees being mahogany, Brazil-wood, Nicaragua-wood, cedar, and logwood. The chief products are the sugar-cane, cacao, cotton, indigo, tobacco, with nearly all the fruits and edibles of the tropics, — plantains, bananas, bread-fruit, arrowroot, citrons, oranges, limes, lemons, pineapples, guavas, etc.; the chief exports being medicinal herbs, as ipecacuanha, aloes, sarsaparilla, ginger, gum acacia, etc. The northern part is rich in minerals, producing gold, silver, copper, iron, and lead; but they are inefficiently worked, the incessant political distractions materially injuring the prosperity of the country. — The revenue of the republic in 1879 was estimated at $1,750,000. and the expenditures at $2,235,000, leaving a deficit of $485,000. There have been annual deficits, increasing in amount, since the year 1865. Two thirds of the total annual revenue are derived from government monopolies on spirits, tobacco, and gunpowder, and the remainder chiefly from import duties and a tax on slaughtered cattle. The expenditure is principally for the maintenance of an army of 2,000 men, and the payment of interest of the public debt. — The total amount of the public debt in 1880 was estimated at $9,500,000. The public liabilities of *N.* were wholly contracted within the country. The commerce of *N.* is very small, and, in the absence of official returns, little of it is known. In the annual report of the Secretary of the Treasury, the commercial intercourse of the U. States with the republic is merged into "Central America." — The two principal rivers of *N.* are the Coco, the longest river in Central America, which has a course of about 350 m., and is navigable for small steamers for about 140 m. from its mouth, and the San Juan, which partly separates *N.* from Costa Rica, and is the only outlet of Lake Nicaragua. This fresh-water lake lies between lat 10° 57′ and 12° 9′ N., lon. 84° 42′ and 85° 53′ W. It is about 110 m. long, and 40 broad. The San Juan River is chiefly known in connection with a proposed line of water communication between the Caribbean Sea and the Pacific Ocean, which line should consist partly of the River San Juan, partly of the Lake of Nicaragua, and partly of a canal to be constructed from the latter to the Pacific Ocean. This project has been often mooted; and on April 19, 1850, the American and British governments entered into a treaty to promote the construction of a ship canal between the two oceans, by way of the Lake of Nicaragua; and renouncing at the same time any exclusive right to or control over such canal Concessions have since been made to different parties by the government of *N.*, but up to the present time no practical operations have been undertaken. In 1880, however, this route has been again strongly advocated in the U. States, less perhaps with the conviction of its practicability than as a check to the success of the interoceanic canal through the Isthmus of Panama, projected by the great French engineer M. de Lesseps. The Nicaragua country, however, appears to present greater facilities for effecting this great work than any other part of Central America, except the isthmus of Panama or Darien. Notwithstanding its natural obstructions, the river San Juan is said to have been occasionally navigable throughout its entire course for sea-going vessels, till the Spaniards, to protect themselves from the attacks of the buccaneers, sunk vessels loaded with stone in its bed. In consequence of the interruption thus given to the stream, a considerable portion of the water is now carried off by a new channel called the Rio Colorado. The San Juan is still, however, navigated, though with much difficulty, in the rainy season, by steamers and other vessels drawing little water. The lake itself has deep water throughout, and is adapted for ships of the largest burden. The distance between its S. W. shore and the Gulf of Papagayo, on the Pacific, is only about 11 m.; and though the intervening country is laid down on many maps as mountainous, there is a place where the height is only about 48 feet above the level of the sea. The surface of the lake is 128 ft. 3 in. above the level of the Pacific; an ascent which might be overcome by a succession of locks. At its western extremity, the Lake of Nicaragua is connected by a small river, the Tipitapa, with the Lake of Leon or Managua. The latter, 55 m. in length by nearly 30 in breadth, has also deep water throughout; and the plan which appears to be at present advocated is, to make the channel uniting these two lakes navigable, and to excavate a canal from the latter to the port of Realejo on the Pacific. But great doubts are entertained whether this or any other route by the Lake of Nicaragua can be made practicable for moderate-sized vessels. The river San Juan runs from end to end through a dense and unhealthy jungle. No laborers are to be had in the country, and it affords nothing for the subsistence of those who may be imported from a distance. And though, one would think, it would be no very difficult matter to clear it of its obstructions, it is plain, from the difference of level between the Lake of Nicaragua and the Atlantic, that others of a more formidable character must be in the way, and that a great deal of lockage would be required to enable vessels of any considerable burden to reach the lake; and after it has been reached, many difficulties have to be surmounted. That they may be surmounted, and a navigable channel formed between the two oceans, is not, certainly, impracticable; but we doubt if large steamers ever get across the continent by its means; and on whatever scale it might be made, the anticipation of advantage to result from it would, we apprehend, be found to be greatly out of proportion with its enormous cost.

Money, Weights, and Measures are the same as in Honduras (which see).

***San Juan del Norte**, San Juan de Nicaragua, Greytown*, the principal seaport of the republic, on the E. coast, at the mouth of the San Juan River, lat. 10° 55′ N., lon. 83° 43′ W., was made a free port in 1860 by treaty with Great Britain. The harbor, once one of the finest in Central America, is now filled with sand, and ships have to lie outside the bar, which is very dangerous even for small boats in heavy weather. The exports consist of skins, hides, india-rubber, cocoa-nuts, rosewood, tortoise-shell, and specie. Pop. 1,000.

Nicaragua or Peach Wood, an inferior kind of Brazil-wood, the produce of *Cæsalpinia echinata*, which grows in the vicinity of the Lake of Nicaragua. It is almost as red and heavy as the true Brazil-wood, but it does not commonly afford more than a third part, in quantity, of the color of the latter; and even this is rather less durable and less beautiful, though dyed with the same mordants. Nicaragua or peach woods differ greatly in their quality as well as price; one sort being so deficient in coloring matter, that 6 lbs. of it will only dye as much wool or cloth as 1 lb. of Brazil-wood: while another variety of it will produce nearly half the effect of an equal quantity of Brazil-wood, and will sell proportionally dear.

Nice. See France (Seaports).

Nick, an incision or mark in the shank of printing-types, which guides the compositor in arranging the letters properly in his composing-stick.

Nickel, a metal closely allied to cobalt and iron,

sometimes found in the native state, but generally in combination with other substances. When pure, it is about 8½ times as heavy as water. It is of a grayish-white color, magnetic, ductile, malleable, requires a high heat for melting, and resists acids very well. *N.* is found combined with arsenic in *kupfer-nickel*, *nickel glance*, and *white nickel*, with sulphur and antimony in *nickel stibine*, with antimony alone in *antimonial nickel*, with sulphur in *nickel pyrites*, with sulphur and iron in *nickeliferous pyrites*, and with iron in most *meteoric stones*. The metal is obtained from many of these ores by smelting and other processes. It is not much used in the arts by itself, except as an electro-plating, but is serviceable in many of its combinations. Many of the copper coins in Europe and the U. States contain various proportions of *N.* (see COPPER COINAGE). Its alloys take part in the preparation of German silver and some other of those white metals which are now highly favored by those who seek for the brilliancy of silver without the cost. *N.* is obtained in this country at Chatham, Conn.; also in Missouri, in the chrome-mines of Maryland, and in Lancaster Co., Pa., etc.

Imp. duty: oxide of nickel, 20 cents per lb.; alloy of nickel with copper, 20 cents per lb.

Nickel-plating, or *Nickelling.* It is to Dr. Isaac Adams, Jr., of Boston, Mass., that we are indebted for the discovery of a simple and practicable method whereby nickel-plating has been rendered a successful and invaluable branch of the arts. Public attention was especially called to the value of Dr. Adams's improvements by the French Academy of Sciences in 1870, and since that time the use of nickel for the plating of metals, especially as a substitute for plating with silver and copper, has been very rapidly and extensively introduced. It has now become an industry of great importance in the U. States. The double sulphate of nickel and ammonium, which is the salt that is generally used for plating, may now be had in commerce almost pure. Cast-nickel plates for anodes may also be obtained. The anodes should considerably exceed in size the articles to be covered with nickel. Any common form of battery may be used. Three Daniell's or Smee's cells, or two Bunsen's, connected for intensity, will be found to be sufficient. The battery power must not be too strong, or the deposited nickel will be black. A strong solution of the sulphate is made and placed in any suitable vessel: a glazed stoneware pot answers very well, if the articles to be covered are small. Across the top of this are placed two heavy copper wires, to one of which the articles to be covered are suspended, to the other the anode. The wire leading from the zinc of the battery must then be connected with the wire from which the articles are suspended, the other battery wire being connected with the anode. In order to prepare the articles for coating, they must be well cleaned by first scrubbing them with caustic soda or potash, to remove any grease, and then dipping them for an instant in *aqua regia* and afterward washing thoroughly with water, taking care that the hand does not come in contact with any part of them. This is accomplished by fastening a flexible copper wire around them, and handling them by means of it. The wire serves afterward to suspend them in the bath. If the articles are made of iron or steel, they must be first covered with a thin coat of copper. This is best done by the cyanide bath, which is prepared by dissolving precipitated oxide of copper in cyanide of potassium. A copper plate is used as an anode. After they are removed from the copper bath they must be washed quickly with water and placed in the nickel bath; if allowed to dry or become tarnished, the nickel will not adhere. Great care must be used through the whole process to keep all grease, dust, or other dirt from the articles to be covered, or else the result will be unsatisfactory. The whole process is one of the most difficult that is used in the arts, it being far easier to gild, plate, or copper an article than to nickel it; but if due care be taken, the results will amply pay for the trouble. — Dr. F. Stolba communicated in 1871 a plan for nickel-plating, by the action of zinc upon salts of nickel, in the presence of chloride of zinc and the metal to be coated. By this process, the author states that he has succeeded in plating objects of wrought and cast iron, steel, copper, brass, zinc, and lead. It is only necessary that the size of the objects should permit them to be covered entirely by the plating liquid, and that their surfaces should be free from rust or grease. The following is the *modus operandi*: A quantity of concentrated chloride of zinc solution is placed in a cleaned metollic vessel, and to this is added an equal volume of water. This is heated to boiling, and hydrochloric acid is added, drop by drop, until the precipitate which had formed on adding water has disappeared. A small quantity of zinc powder is now added, which produces a zinc coating on the metal as far as the liquid extends. Enough of the nickel salt (the chloride or sulphate answers equally well) is now introduced to color the liquid distinctly green; the objects to be plated are placed in it, together with some zinc clippings, and the liquid is brought to boiling. The nickel is precipitated in the course of fifteen minutes, and the objects will be found to be completely coated. The coating varies in lustre with the character of the metallic surface; where this is polished the plating is likewise lustrous, and *vice versa*. Salt of cobalt affords a cobalt plating, which is steel-gray in color, less lustrous, and more liable to tarnish than the nickel.

Nickel Silver. See GERMAN SILVER.

Nicknackery, trifles; toys.

Nicotine, a volatile alkaloid contained in the tobacco-plant. It is a limpid, colorless, oily liquid, with an irritating and powerful odor of tobacco. It is extremely poisonous, a single drop being sufficient to poison a large dog.

Niello, a peculiar mode of ornamenting surfaces of metal, much practised some centuries ago. The surface is engraved (more deeply than for printing), usually on silver, and the lines are filled up with a black or colored composition of silver, copper, lead, sulphur, and borax. The dark colors thus inlaid, contrasting with the bright surface of the silver, produce an effect bearing some analogy to that of a print from a copper plate. The art, after being long neglected, was revived a few years ago by Wagner, a silversmith at Berlin. Its principal use, at the present time, is in brass or zinc door-plates, signs, etc., in which the plates are engraved and the depression filled with wax.

Nierstein. See GERMANY (WINES OF).

Nightcap, a covering for the head to sleep in; many are open-woven of worsted or cotton; those for females are of different materials trimmed with borders.

Night-Clothes, a bed-gown and nightcap; garments to sleep in.

Night-Light, a small mortar taper, for burning in a sleeping-room, and which stands in water for safety.

Nightman, one who empties privies in towns; always performed at night.

Night-Pan, NIGHT-STOOL, a bedroom close-stool or commode; a bed-pan; a portable water-closet.

Nightshade, a name given to several plants, two of which are used in medicine: 1. The Deadly *N.*, *Atropa belladonna* (see BELLADONNA). 2. The sweet or woody *N.*, *Solanum dulcamara* (Fig. 372), the dried young branches of which, called *dulcamara*, are slightly narcotic and diuretic, and are sometimes given in decoction. The dulcamara is also given in solid extract, fluid extract, and infusion.

Night-Soil, human ordure, collected and used as manure.

Nil (Latin), nothing; a commonly used term for cancelling, in accounts or book-keeping. meaning to pass it over or take no notice of it.

Nile. See EGYPT.

Ninepins, the wooden pins in the game of skittles, which are aimed at with a heavy wooden ball.

Ningpo. See CHINA.

Ninh-hai. See COCHIN CHINA.

Nip, a short turn in a rope. — A pinch with something sharp. — A small cut. — A vessel caught between icebergs. — A small cup. — A draught of ardent spirits. — In mining, the gradual approach of the strata above and below a seam and terminating it.

Nippers, a pair of pincers; tweezers, wire-pliers; instruments for cutting up loaf-sugar. — In

ships, a number of yarns twisted together to secure a cable to the messenger.

Nipple, that part of the percussion lock of a gun over which the cap is placed.

Fig. 372.—Sweet Nightshade.

Nipple-Shield, a concave shield with a cap of horn or vulcanite, for the protection of the mother's nipple, that it may not be bitten by the nursing infant.

Nitrate, an oxygenated base combined with nitric acid.

Nitrate of Lead, crystallized nitric acid and oxide of lead, which is much employed in the chrome-yellow style of calico-printing.

Nitrate of Potash. See Saltpetre.

Nitrate of Silver. See Silver (Nitrate of).

Nitrate of Soda, Cubic Nitre, consists of nitric acid and soda. It is similar to saltpetre in its properties, differing chiefly in being more pungent in taste, more soluble in cold water, more inclined to attract moisture from the atmosphere, and in crystallizing in a rhomboid form. This salt is found in immense quantities in deposits in South America, particularly in the districts of Atacama and Tarapaca in Peru, near to the frontiers of Chili, where it is found sometimes efflorescent, sometimes crystallized, but oftener confusedly mixed with clay and sand. It is highly esteemed as a manure for pastures, and indeed for almost all sorts of agricultural produce, except that grown upon heavy, wet soils. It is also applied to many of the purposes for which nitrate of potash is used, though, being more deliquescent than that salt, it is not adapted for the manufacture of gunpowder. *Imp.* free.

Nitrate of Strontia, crystals which, when mixed with charcoal and chlorate of potash, afford the brilliant red light of the theatres.

Nitre. See Saltpetre.

Nitric Acid [Fr. *acide nitrique;* Ger. *Saltpetersaüre*], an intensely acid liquid, procured by distilling nitre with strong sulphuric acid. When pure it is colorless; and when most concentrated it has a sp. gr. of 1.5, in which state it contains 25 per cent of water. It is eminently corrosive, and its taste is sour and acrid. In commerce it is sometimes called *aquafortis,* and generally occurs of a yellowish color, owing to its containing nitrous acid in solution; besides which, it is often highly diluted, and contaminated with sulphuric acid, chlorine, and oxide of iron. It is employed in a great variety of chemical processes; in metallurgy and assaying, for etching on iron and copper, in dyeing, and in medicine.

Nitrogen, a transparent, colorless, permanent gas, well known as one of the constituents of the atmosphere, which contains volumetrically about 78 per cent, mechanically united with 22 per cent of oxygen. Although characterized by its inactivity when in a free state, it enters into combination with the other elements, forming compounds possessed of the most energetic properties. With hydrogen it forms ammonia; with oxygen, nitric acid; with carbon, cyanogen; with carbon, hydrogen, and other elements, an almost infinite number of bodies, known as the vegetable and artificial alkaloids, such as quinine, morphine, aniline, etc. Besides these, most coloring-matters contain nitrogen, and it is an essential constituent of the proximate principles of animal and vegetable bodies; such as albumin, fibrin, casein, etc.

Nitro-Glycerine, Blasting Oil, Glonoine Oil, Nitroleum, a violently explosive oily liquid, having a sweet aromatic taste, colorless when pure, but as manufactured, it is usually of a yellowish color. Sp. gr. 1.6.

It is easily prepared by dissolving glycerine in a mixture of equal measures of the strongest nitric and sulphuric acids, previously cooled, and pouring the solution in a thin stream into a large volume of water, when the *N.* is precipitated. It is advisable to add the glycerine to the mixed acids in very small quantities at a time, and to cool the mixture in a vessel of water after each addition. When the *N.* has subsided, the water may be poured off, and the oil shaken several times with water, so as to wash it thoroughly. This oil is far more violent in its explosive effects than gun-cotton, more nearly resembling the fulminates, though not so easily exploded. If a drop of *N.* be placed on an anvil and struck sharply, it explodes with a very loud report, even though not free from water; and if a piece of paper moistened with a drop of it be struck, it is blown into small fragments. On the application of a flame or of a red-hot iron to *N.*, it burns quietly; and when heated over a lamp in the open air it explodes but feebly. In a closed vessel, however, it explodes at about 360° F. with great violence. For blasting rocks the *N.* is poured into a hole in the rock, and exploded by the concussion caused by a particular kind of fuse charged with a little gunpowder. It has been stated to produce the same effect in blasting as ten times its weight of gunpowder, and much damage has occurred from the accidental explosion of *N.* in course of transport. When *N.* is kept, especially if it be not thoroughly washed, it decomposes, with evolution of nitrous fumes and formation of crystals of oxalic acid; and it may be readily imagined that, should the accumulation of gaseous products of decomposition burst one of the bottles in a case of *N.*, the concussion would explode the whole quantity. A drop of *N.* is said to cause very violent headache, and in larger doses it appears to be decidedly poisonous. When *N.* first came into use for blasting purposes, it was used in the liquid form under the name of "blasting oil"; but the dangers attending the handling of the substance in this state are so great, that it is now usual to mix the liquid with some powdered substance which is itself without action, and merely serves as a vehicle for containing the *N.* To mixtures of this kind the names *dynamite, dualine, lithofracteur,* etc., have been given.

Transportation. By the *third* section of the Act of Congress of July 28, 1866, it is enacted that "it shall not be lawful to transport, carry, or convey, ship, deliver on board, or cause to be delivered on board, the substance or article known or designated as *N.* or glonoine oil, nitroleum or blasting oil, or nitrated oil, or powder mixed with any such oil, or fuel saturated with any such article, upon or in any ship, steamship, steamboat, vessel, car, wagon, or other vehicle, used or employed in transporting passengers by land or water, between a place or places in any foreign country and a place or places within the limits of any State, territory, or district of the U. States, or between a place in one State, territory, or district of the U. States and a place in any other State, territory, or district thereof"; and any person, company, or corporation violating the provisions of this law are "liable to a fine of not less than $1,000 nor more than $10,000, at the discretion of the court, one half to the use of the informer." And by the *fifth* section of the same act it is declared unlawful to "ship, send, or forward any quantity of the said substances or articles, or to

transport, convey, or carry the same, by a ship, boat, vessel, vehicle, or conveyance of any description, upon land or water, to or between places. . . . (as in third section), unless the same shall be securely enclosed, deposited, or packed in a metallic vessel surrounded by plaster of Paris, or other material that will be non-explosive when saturated with such oil or substance, and separated from all other substances; and the outside of the packages containing the same be marked, painted, or labelled in a conspicuous manner with the words 'Nitro-Glycerine, Dangerous'"; and the violation of this section renders the party liable to a "fine of not less than $1,000 nor more than $5,000, at the discretion of the court, one half to the use of the informer,"

Nitroleum. See NITRO-GLYCERINE.

Nitrometer, an instrument for determining the quantity and value of nitre.

N. N. E., the nautical abbreviation for the compass point of "North-northeast"; N. N. W. being "North-northwest."

No., the commercial abbreviation for "number."

Nobbler, a dram of spirits.

Noctograph, a writing-frame for the blind.

Nog, a piece of wood shaped like a brick.—Square blocks of wood piled on each other to support the roof of a mine.

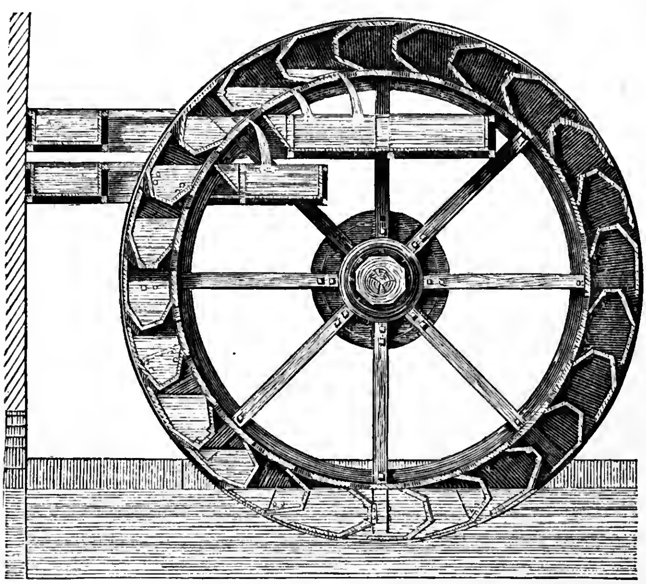

Fig. 373.—NORIA.

Noggin, a name in the North of England for the gill or quartern, the fourth part of a liquid pint; a little mug.

Nogging, brick-work in panels carried between quarters.

Noils, the short pieces and knots of wool left after combing out the "tops" by the combs, or when the sliver is drawn off; noils being only fit for coarse woollen yarn, or for cloth manufacture. *Imp.* duty: as wool, not as wool waste.

Noisette [Fr.], hazel-nut.

Nolis, Nolissement [Fr.], freight, the chartering or hiring a vessel.

Nominee, one appointed or chosen by another.

Nonpareil, a small kind of printing-type, between minion and agate. It has 143 ems to the foot.

Noose, a running or slip knot; a lasso.

Norfolk. See VIRGINIA.

Norfolk Cheese. See CHEESE.

Noria, a machine for raising water, usually consisting of a bucket-wheel, or wheel with travelling water-raising buckets, variously constructed and operated, and of which Fig. 373 represents one of the best forms. The name is also given to the CHAIN-PUMP (which see).

Norma, a model or pattern; a square for measuring right angles, used by carpenters, masons, and other artificers to make their work rectangular.

Norsels, pieces of line used for tying nets to head-ropes.

North American Insurance Co., located in Boston, Mass., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $68,939.17; premiums, $39,375.36. Premiums received since the organization of the Co., $419,481.35; losses paid, $1,166,120.04; cash dividends paid to stockholders, $119,950.

North Carolina, one of the S. E. States of the American Union, bounded N. by Virginia, E. and S. E. by the Atlantic Ocean, S. by South Carolina and Georgia, and W. by Tennessee. It lies between lat. 33° 53′ and 36° 33′ N., lon. 75° 25′ and 84° 30′ W., presenting an extreme length E. and W. of 420 m., with a maximum breadth N. and S. of 180 m. Area, 50,704 sq. m. It is divided into 94 counties. *Raleigh*, the capital, lies in lat. 35° 47′ N., lon. 78° 48′ W., on the Raleigh and Gaston and the Raleigh and Augusta Oil-Line Railroads, and on the North Carolina division of the Richmond and Danville R.R., 230 m. S. by W. of Washington. It has a large trade in cotton and dry-goods. Pop. 10,000. The other cities are Wilmington, the largest city in the State, and New-Berne (two seaports given below), Fayetteville (pop. 5,500), and Charlotte (pop. 5,000). Pop. of the State about 1,200,000.

The coast-line of *N. C.* is long and deeply indented. Commencing at Little River Inlet on the S. Carolinian frontier, it takes a course nearly E. to Cape Fear, thence N. E. to Cape Lookout and Cape Hatteras, and terminates at the Virginia line, forming a distance of over 400 m. Three large, shallow sounds, Albemarle, Currituck, and Pamlico, cut far into the land, and have *antennæ* in the shape of numerous small bays or inlets on either hand. A concatenation of narrow, shoaly lagoons, charged with ever-shifting sand-bars, skirts the coast S of Cape Lookout, and hence the navigation of the whole seaboard is exceedingly intricate and hazardous. For a distance extending from the seaboard 60 to 80 m. into the interior, and including the turpentine region, the surface of the State is level, and dotted with many series of oozy swamps and morasses; the streams intersecting it are sluggish and slimy, and the lands, for the most part, arenose and poor, except along the river-bottoms, where it is highly productive, yielding abundant crops of cotton, maize, tobacco, and rice. N. of Albemarle Sound the "Great Dismal Swamp," covering an area of 150,000 acres, extends into Virginia, while its sister swamp, the "Little Dismal, or Alligator," with a superficies nearly as large as the former, is located between Pamlico and Albemarle Sounds. Other considerable-sized swamps lie farther S., interspersed with a number of small lakes. Parts of the "Little Dismal Swamp" have been sufficiently reclaimed to bear valuable rice and cereal crops. It is estimated that the whole area of swamp-lands throughout the State spreads over not less than 3,000,000 acres. As the interior becomes farther penetrated, the characteristic configuration of the country undergoes a change. The surface is found to acquire a hilly, or, rather, undulating aspect, consisting of alternate ridges and

valleys, and forming what is called the *Pitch-pine region.* Here the soil is of decided fertility, producing the principal agricultural staples, while towards the W. extremity of the State, beyond the Yadkin and Catawba Rivers, a large plateau of considerable altitude, being from 1,000 to 2,000 feet above sea-level, forms, as it were, the W. base of the Alleghany range traversing the State from N. E. to S. W., and culminating in summits of superior elevation. — The rivers of *N. C.* are numerous, but they have shifting sand-bars at their mouths, and rapids in their descent from the hilly regions. The principal is Cape Fear, which empties into the Atlantic near Cape Fear after a course E S. E. of about 300 m. It is navigable for vessels drawing 12 feet of water to Wilmington, 34 m., and for small boats to Fayetteville, 120 m.— The mineral wealth of *N. C.* is remarkably great. Gold has been found in 23 counties, and is still wrought very considerably. Copper ores of various kinds abound in various parts of the State, and some silver is also obtained. The coal-fields have iron and fire-clay in abundance, and excellent red hematites and other ores are prevalent in the azoic regions. Lead, copperas, zinc (here largely smelted), antimony, and other metals are known to exist. Mica is profitably mined in Mitchell and Yancey Counties. — The upland tracts are well timbered with ash, oak, walnut, hickory, lime, and other trees; the low country produces pine in great perfection, and the swamp-lands luxuriate in dense collections of cedar, cypress, maple, oak, and poplar, undergrown with vines and other creepers. The fruits assimilate with those of the neighboring States. The Scuppernong and Catawba grapes are native of this State, and of late several large wine-growing establishments have been undertaken at Enfield and elsewhere. — The cotton product of *N. C.* bears an exceptionally high character in the market. Indian corn is extensively raised throughout the State; tobacco has long been one of the leading products; sweet potatoes are largely produced; rice does well in the swamps, especially in the S. E. districts; and vine-dressing is becoming a profitable occupation The relative value of agricultural products for the year 1879 is given in this work under the names of the principal crops. The number of farms in *N C.*, as reported by the last census, was 93,565. The total number of acres of land in farms, 19,835,440; of which 5,258,742 consisted of improved lands, 12,026,894 of woodland, and 2,549,774 of other unimproved soil; the cash value of farms under cultivation, $78,-211,083, exclusive of $4,082,111 of implements and machinery; amount of wages paid for husbandry during the year, $8,342,-856; total value of farm products, $57,845,940; of lumber, $1,089,115. Next to agriculture, the distillation of turpentine and tar forms the leading industrial feature of the State. The turpentine lands are valued at from $2 to $20 per acre, with from 500 to 1,000 pine-trees growing upon an acre, containing on an average 2,000 boxes (or pockets cut in the stems above the ground), and producing on an average from 12 to 16 barrels of turpentine, or 2 barrels of spirits and 8 of rosin. This business is regarded as favorable to health and longevity, and is generally found very profitable to the proprietors. *N. C.* is the great seat of the turpentine industry in the U. States Of the 7,575,556 gallons of spirits of turpentine exported from the U. States in 1879, 4,152,567 gallons, worth $1,103,876, were exported directly from Wilmington. During the same year the exports of rosin and turpentine at that port amounted to 493,503 barrels, valued at $703,523; tar and pitch, 52,350 barrels, valued at $31,259. — In 1879 *N. C.* had 15 national banks, whose paid-in capital was $2,551,000. At beginning of that year the State debt (exclusive of special tax bonds) amounted to $16,960,045; interest due and unpaid, $6,244.470. Gross debt (including special tax bonds), $28,326,045; interest due and unpaid. $16,404,652. Total, $44,730,697. The funding bill of Feb., 1879, provides for the refunding of the old ante-war bonds at 40 per cent, the new railroad bonds at 25 per cent, and the funding bonds of 1866 and 1868 at 15 per cent, all overdue coupons and interest to be surrendered. The new bonds are to run 30 years and bear 4 per cent interest; coupons to be receivable for taxes, — the first coupon to be made payable Jan. 1, 1881. — The assessed value of real and personal estate in 1879 was $160,000,000; tax per capita, $0 51. — In 1879 *N. C.* had 1,448 m of railroad. The following table exhibits the names of the railroad companies, the total length of roads, and the total length in the State: —

Fig 374.—Seal of North Carolina.

Companies	Total length of line.	Total length in *N. C.*
	Miles.	Miles.
Atlanta and Charlotte Air-Line	269.00	34.70
Atlantic and North Carolina	95.00	95.00
Atlantic, Tennessee, and Ohio	46.80	46 80
Cape Fear and Yadkin Valley	43.00	43 00
Carolina Central	242.00	242 00
Charlotte, Columbia, and Augusta	195.00	10 50
Chester and Lenoir	52.00	17 00
Halifax and Scotland Neck	20.00	20.00
Jamesville and Washington	22.00	22.00
Milton and Sutherlin	9.00	3.00
North Carolina (R. & D. Va.)	223.15	223.15
North-western North Carolina (R. & D. Va.)	25.19	25.19
Petersburg	64.00	7.69
Piedmont (R. & D. Va.)	48.60	42 60
Raleigh and Augusta Air-Line	98.75	98.75
Raleigh and Gaston	97.00	97.00
Seaboard and Roanoke	80 00	20.00
Spartanburg and Asheville	48.00	27.00
Western North Carolina	127.00	127.00
Wilmington R.R Bridge	2.00	2.00
Wilmington, Columbia, and Augusta	189 00	63.50
Wilmington and Weldon	180.50	180.50

N. C. has 4 ports of entry, here given in their alphabetical order.

Beaufort, situated on an inlet of the Atlantic Ocean, at the mouth of Newport River, 11 m N. W. of Cape Lookout, and 130 m. S. E. of Raleigh. Its harbor, which is the best in the State, is accessible by steamboat from Albemarle Sound. It has a considerable coasting trade, principally in turpentine and rosin. There are 77 vessels, of 1,307 tons in aggregate, belonging to the port. Pop 3,000.

Edenton, the port of entry of Albemarle customs district, is situated on a bay opening on Albemarle Sound, about 4 m. from the mouth of Chowan River, and 130 m. E. by N. from Raleigh. There are belonging to the district 72 vessels, of 2,486 tons in aggregate. Pop. 1,500

New-Berne, an important manufacturing city, and the port of entry of Pamlico customs district, is situated on the river Neuse (which is here about 2 m. wide at its confluence with the Trent), 40 m. from its mouth, and 90 m. N. E. of Wilmington, on the Atlantic and North Carolina R.R. It communicates by steamers with New York, Baltimore, and Norfolk. It has a considerable coastwise trade, its exports consisting chiefly of grain, lumber, tar, and turpentine. In 1879, 186 vessels of 121,984 tons entered, and 186 vessels of 118,287 tons cleared, the port. There are belonging to the district 101 vessels, of 2,322 tons in aggregate. Pop. 6,500.

Wilmington, the largest and most commercial city of the State, situated on the left bank of Cape Fear River, about 20 m from the sea, and 110 m. S. S. E. of Raleigh; lat. 34° 11′ N., lon. 78° 10′ W. The harbor admits vessels drawing 16 feet of water, which depth will be much increased when the improvements in course of execution are completed. Wilmington is the principal market in the world for naval stores. Its commerce, both foreign and coastwise, is very extensive. For the year 1879 its foreign imports amounted to $364,635, and its exports to $4,748,931, which, besides the articles of naval stores noticed above, consisted principally of 64,431 bales of cotton, valued at $2,734,358, and timber, $170,751. In 1879, 7 vessels, of 1,220 tons in aggregate, entered, and 313 vessels, of 100,538 tons, cleared, in the foreign trade. In the coastwise trade, 154 vessels, of 75,596 tons, entered. and 130 vessels, of 78,794 tons, cleared, the port. There are belonging to the district 77 vessels, of an aggregate burden of 5.929 tons. Wilmington has 1 national and 3 other banks. It is the terminus of the Wilmington and Weldon, the Wilmington, Columbia, and Augusta, and the Carolina Central railroads. It has regular communication by steamers with Baltimore, Philadelphia, and New York, and steamboats ply on Cape Fear River, between this port and Fayetteville. Pop. 18,000.

North Carolina R.R. runs from Goldsborough to Charlotte, N. C., 223.15 m. This Co., located at Company Shops, N. C., was chartered in 1849, and the road, completed in 1856, was leased in 1871, for 30 years, to the Richmond and Danville R.R. Co., at a rental of $260,000 a year. Capital stock, $4,000,000; funded debt, $291,500; floating debt, $1,160,521. Cost of construction and equipment, $4,933,778.

North-eastern R.R. runs from Charleston to Florence, S. C., 102 m. This Co., whose offices are in Charleston, was chartered in 1851, and the road was completed in 1856. Capital stock, $899,350; funded debt, $1,142,000. Cost of construction and equipment, $2,148,130.

Northern Insurance Company, a fire-insur-

ance Co., located in Watertown, N. Y., organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $250,000; net surplus, $51,127; premiums, $184,114.67. Premiums received since the organization of the Co., $205,302.39; losses paid, $790,158.09; cash dividends paid to stockholders, $25,000.

Northern Railway runs from Oakland to Suisun, Cal., 46.50 m., with extension from Woodland to Willows, 67 m.; total length of road, 113.50 m. This Co., located at San Francisco, was chartered in 1871, and the road was completed in 1878. Part of the road was leased in 1876 to the Central Pacific Co., for $1,500 per mile per annum, while the Co. leases the San Pablo and Tulare R.R. for $300 per mile per month. Capital stock, $2,819,150; funded debt, $2,435,000; construction liabilities, $2,015,439. Cost of road and works, $7,248,559.

Northern R.R. runs from Concord to West Lebanon, N. H., 69.50 m., with branch from Franklin to Bristol, 13.41 m.; total length of road, 82.91 m. This Co., located at Concord, was chartered in 1844, and the road was completed in 1847. Capital stock, $3,068,400, representing cost of construction.

Northern Central R.R. runs from Baltimore, Md., to Sunbury, 137.66 m.; branches, 13.05 m.; total length of line, 150.71 m. Lines leased: Shamakin Valley and Pottsville R.R., 31.10 m.; Elmira and Williamsport R.R., 76.70 m.; Chemung R.R., 17.40 m.; Elmira, Jefferson, and Canandaigua R.R., 46.60 m. Total length of road operated, 322.51 m. This Co., which is located in Baltimore, is the consolidation, made and approved in 1854, of the Baltimore and Susquehanna, York and Maryland, and York and Cumberland R.R. Cos. Capital stock, $5,842,000; mortgage to the State of Maryland, $1,500,000; funded debt, $13,893,000; floating debt, $1,128,532. Per contra: cost of road and appurtenances, $12,184,505; equipment, $4,196,107; real estate, $1,024,545; stocks of leased lines (at cost), $3,048,681; other assets, $1,909,688.

Northern Pacific R.R. See this name in the Appendix.

North Pacific Coast R.R. runs from Saucelito to Moscow Mills, Cal., 74.25 m.; branch, and leased line, 5.50 m.; total length of road operated, 79.75 m. This Co., whose offices are in San Francisco, was chartered in 1871, and the road was completed in 1876. Capital stock, $1,074,900; floating debt, $2,017,114. Cost of construction and equipment, $2,788,148.

North Pennsylvania R.R. See this name in the Appendix.

North River Insurance Co., a fire-insurance Co., located in New York City, organized in 1822. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $350,000; net surplus, $108,148; premiums, $26,803. Premiums received since the organization of the Co., $2,909,787; losses paid, $1,226,571; cash dividends paid to stockholders, $2,176,900.

North-western Mutual Life-Insurance Co., located in Milwaukee, Wis., organized in 1858. *Statement*, Jan. 1, 1880: Assets, $17,112,361; liabilities, $13,907,571; gross surplus, $3,205,790; new policies, 3,739, amounting to $9,036,426; policies in force, 33,066, amounting to $61,948,888; premiums, $1,860,977; dividends paid to policy holders, $792,183.

North-western National Insurance Co., a fire-insurance Co., located in Milwaukee, Wis., organized in 1869. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $600,000; net surplus, $144,251; premiums, $256,323. Premiums received since the organization of the Co., $3,595,367; losses paid, $2,015,618; cash dividends paid to stockholders, $279,000.

Norway. See Sweden and Norway.

Norwich and Worcester R.R. See this name in the Appendix.

Nosebag, a feeding bag with oats, etc., suspended to the horse's head.

Noseband, part of a horse's bridle.

Nose-Piece, the nozzle of a hose or pipe.

Nosing. See Joinery.

Nostrum, a quack medicine; a secret remedy.

Notary-Public, an officer whose duties and functions in the U. States resemble those of the same officer in England. They are appointed by the respective governors of the States for a limited number of years, or during good behavior, and derive their powers by the statute laws of the States; and in cases where these laws do not specify their powers, — as, for instance, in Massachusetts, — it must be presumed that all the powers which, by general usage, the custom of merchants, and the law of nations, are generally exercised by these officers, are also vested in them. We may state their general and customary functions to be, to demand acceptance and payment of foreign and inland bills of exchange and promissory notes, and to protest the same for non-acceptance and non-payment; to note and draw up ship protests, and all other protests which are customary according to the usage of merchants; and to exercise such other powers and duties as by the law of nations, and according to commercial usage, or by the laws of any other State, government, or country, may be performed by notaries public. But although notaries public are generally considered as accredited officers in other countries, and affidavits sworn before and instruments authenticated by them are received in evidence in foreign courts, it is required by foreign courts that the consuls of the respective foreign states in which the document is to be used certify to the fact that the person whose signature and seal are affixed is a Notary-Public duly appointed. This is, however, not necessary in a protest for the non-acceptance or non-payment of a bill of exchange. The laws of the different States of the Union, in some instances, give some peculiar powers to their notaries, and hence the laws of each State must be consulted in regard to them. The principal functions of an American notary are, to protest bills of exchange and promissory notes on their being dishonored, and, as a part of this function, to present and demand payment of these mercantile instruments. Although the notaries with us generally give notice of the dishonor of bills and notes to antecedent parties, it is not their duty to do so, unless made so by statute, or they undertake so to do as a part of their duty; and then they are liable for any negligence in the discharge of this duty.

Notching. See Joinery.

Note, a brief minute of any business transaction, etc., taken at a time; a foot-note, mark, or reference in printing. — A promise to pay. See Bank-Note, Bill of Exchange, Promissory Note.

Note-Broker, one whose principal occupation is to buy, sell, or negotiate promissory notes.

Note-Paper, small-sized paper for writing notes or short letters on.

Notice, a notice; information given. — In the law of bills of exchange and promissory notes, a holder of a bill is bound to give *N.* of non-

acceptance or non-payment, to any party other than the acceptor or maker, on whom he means to claim for recourse. Want of *N.* of non-acceptance, however, is no bar to the claim of an onerous indorsee, who has taken the bill before it becomes due, and without marks of dishonor. If a conditional acceptance is taken, *N.* must be given, otherwise the parties may be released. *N.* is required, that the drawer and indorsers may take measures, through their transactions with the drawee or otherwise, to secure their remedy in the case of being compelled to take up the bill. It is a presumption of law that damage is occasioned where N. is omitted; and proof to the contrary will not be received. If the bill is for the accommodation of the drawer, and the drawee has no effects of his, and is not otherwise under any obligation to accept or pay, the drawer is not entitled to *N.* of dishonor. But the nature of the bill, as between the original parties, will not affect the right of an indorser who has been an onerous holder, to *N.* If the drawee has had any effects of the drawer in his hands, it would be dangerous and inconvenient, merely on account of the shifting of a balance, to hold *N.* not to be necessary. It is no excuse for want of *N.*, where there are effects, that the drawee has explained to the drawer that he would not be able to provide for the bill. *N.* from any party accrues to the benefit of every other party, between the person who gives it and him to whom it is given. The *N.* must bear that the holder intends to claim recourse, and so information of dishonor, casually obtained, or communicated by a third party, will not suffice; but a holder who sends *N.* to his immediate indorser may profit by its being conveyed to the drawer if without delay, either directly from that indorser, or from him through another indorser. It is prudent on the part of each party who intends to claim recourse to send *N.* to every party against whom he thinks he may have any occasion to exercise the right of recourse. In the case of a foreign bill, when the *N.* is to a party abroad, information should be conveyed of protest having been taken. See PROTEST.

There is no particular form for *N.*; it is sufficient that both the dishonor and the intention to claim in recourse be distinctly stated. *N.* should be sent without delay; it may be sent immediately on acceptance or payment being absolutely refused, as such refusal is dishonor, though retracted. Where parties reside in the same place, *N.* of non-payment should be given on the expiration of the day following the refusal; where they reside in different places, it should be posted on such day following. It is settled that it is *never necessary* to give or forward *N.* of the non-payment *on the same day* when a bill or note falls due. The same rule applies to non-acceptance of inland bills; but it is now settled that in the case of a *foreign* bill, *N.* should be given on the day of the dishonor, if any post or ordinary conveyance sets out on that day; and if not, by the next earliest conveyance. Each party has a day for giving *N*, and he will be entitled to the whole day, though the post by which he is to send it goes out within the day, and though there be no post the succeeding day for the place to which he is to send. Therefore, where the *N.* is to be sent by the post, it will be sufficient if it be sent by the post of the following day, or if there be no post on the following day, on the day after. Sunday is not counted a day in *N.*; and the person who receives one on that day is in the same situation as if he received it on Monday. Days set apart by the religion of the individual to be kept holy seem generally to be held equivalent to Sunday. Bills, the term of payment of which would happen on Sunday, Good Friday, or Christmas Day, are payable on the previous day. Delay to give immediate *N.* may be excused by the circumstances. The absence of the drawer from his usual place of business and residence, and the sudden illness of the holder, may constitute an excuse; but the absence of the holder, in consequence of the sudden death of a near relative, is no excuse. A holder can only be called upon to use due diligence to discover the party, and if there is any impediment, *N.*, without undue delay after discovery has been made, suffices. Due care must be taken to provide for the N. reaching the proper person. If the holder knows the particular address of the drawer in a large town, where a letter is not likely to reach him without that address, it should be given in full; but if the address cannot be ascertained, or the party is distinguishable by his mere name and the town in which he lives, *N.* addressed in such form will suffice. *N* to a company through one of the partners suffices. When a bill has been drawn by a firm upon one of the partners, it is unnecessary to give *N.* of dishonor to the firm. If the holder give time, and send *N.* of non-payment to the drawer, he will not require to give second *N.* on expiration of the time without payment. An agent employed to present a bill is responsible to his employer for neglect of *N.* *N.* may be held as received by the party entitled to it. Payment of a part, promise to pay or to see paid, a promise "to set the matter to rights," etc., have been held to amount to a waiver. If a person has made a promise to pay, without having had *N.*, it is now held as a waiver of that *N*, though he made the promise in ignorance of his right to found on want of *N.*, provided there is no fraud in the case. In promissory notes, the only parties to receive *N.* are indorsers.

Notions, the general name in America for small wares, such as spool-cotton, tapes, hooks-and-eyes, pins, needles, etc.

Nova Scotia. See CANADA and HALIFAX.

Novelist, a writer of novels or works of fiction.

Nowel, the inner part of a large loam mould used in a foundry.

N. O. P. F., an abreviation used in the tariff of customs duties and in this work for "not otherwise provided for."

Noyau [Fr.], the stone of a fruit; hence the name of a delicate and aromatic French liqueur made with white brandy, the kernels of peaches, and sweet and bitter almonds, and then sweetened with lump sugar. The finest noyau, both in strength and flavor, is made in the island of Martinique.

Noyl. See COMBING.

Nozzle, the end of a bellows or spout.

Nugget, the name given to the larger lumps of gold occasionally found in gold alluvium. Smaller lumps are called *pepitas*, and the finest particles *granos* or gold grains. *N.* have been found of extraordinary dimensions and weight; but, as may be supposed, they are comparatively rare. They are always water-worn.

Nuisance, any occupation or trade tending to endanger public health.

Nuits. See BURGUNDY WINES.

Number-Printing, a name that may conveniently be given to that process whereby successive numbers are printed on successive copies of the same ticket, or successive pages of the same book. *Bank-notes* and *railway tickets* exhibit two familiar forms of this kind of printing. In bank-notes the general contents of the note are printed first, and the number afterwards.

The numbering machine was invented by Bramah, and greatly improved by Oldham. There is a series of disks, or rowels, face to face on the same axis; each rowel can be made to rotate separately, or each can be made to act upon its neighbor at certain points of the process; and each has all the digits standing out as types upon its edge. After printing a number, say 13,724, the apparatus makes a slight shift and presents 13,725 for the next printing; and so on until 13,729, when the next shift alters *two* of the digits, giving to the next arrangement the form 13,730. The simple principle being once understood, its application can be carried out to any extent. Shaw's *page-numbering* machine and Edmonston's *railway-ticket machine* produce similar results by mechanism analogous in principle, though differing in detail. The more complete of these machines have self-acting apparatus for inking the types, as is now familiar to every one in the booking-offices of the several railway-companies, where each ticket is numbered and dated by means of the small machine at the elbow of the clerk. Waterlow's machine for these purposes is very efficient. The French have not been wanting in attention to this subject. M. Trouillet's *numérateur mécanique* is a very ingenious machine for numbering coupons, railway certificates, or bank-notes, as likewise for paging account-books, or numbering bales or packages of merchandise. It consists of a rowel-formed circle, on the points of which are cut in steel the ten numerals; it turns on an axis which may hold from two to six of these rowels. The figures that are to move are left free; those that are stationary are fixed by a screw at the side. The figure is changed by the action of a small lever, the press-

ure of which turns the rowel so as to bring the next figure in its place, and at the same time inks itself from a small inking apparatus fixed above the figures With six rowels numbers 1 to 999,999 may be impressed, the first of the series appearing as 000,001. The instrument may also be used dry for stamping anything where color is not needed, but only an impression: or with common marking-ink for stamping bales of goods or wooden packing-cases. The instrument here described is for *hand* use. There is another variety for *press* use, executing the additional process of printing labels requiring dates, such as those of the month and year. Hoe's machine has peculiar apparatus for rotating and inking the registering disks.

Numismatist, one skilled in coins and medals, and keeping a collection for sale.

Nun-Buoy, a buoy tapering at each end.

Nung, a large package or bale, generally applied to cloves or senna.

Fig. 375.—NUTMEG.

Nun's Thread, a kind of thread formerly made to a large extent in Paisley.

Nursery, a plantation for raising shrubs, young trees, and plants.

Nursing-Apron, an apron of flannel or oilcloth, worn by females who attend to infants.

Nursing-Bottle. See FEEDING-BOTTLE.

Nut, the fruit or kernel of many trees and shrubs, several of which, being edible, form large articles of commerce; such as almond, cob-nuts, hazel-nuts, filberts, Brazil-nuts, cocoa-nuts, pistachio-nuts, walnuts, etc. See these respective names.—Also a piece of iron screwing on to secure a bolt.

Manuf. Besides the simpler and more usual hand-process, there is for the making of nuts and bolts a large establishment at Birmingham in which such articles are made, in enormous quantity and with great rapidity, by machinery. The pig-iron, after being puddled and rolled in the usual manner, is placed in a reverberatory furnace, rolled to the required size, and placed in a nut-making machine. Here a sufficient length of iron is cut off, forced into a die-box (of quadrangular or any other required form), and punched simultaneously from both sides while under pressure. The process is so conducted that the metal is solidified while cutting the hole; the hole is made exactly central, as well as true and smooth, the angles are made regular and equal, and the size is rigorously defined and maintained. The machine can make from 50 to 80 nuts per minute.

Nut-Cracker, a metal wrench, with two handles working on a hinge, for breaking the hard shells of nuts.

Nut-Galls. See GALLS.

Nutmeg [Dutch, *muskaat:* Fr. *muscade, noix muscade;* Ger. *Muskatennüss;* It. *noce muscada;* Malay, *buah-pala;* Sp. *moscada*], the hard, aromatic seed of the *Myristica moschata* (Fig. 375), a tree from 20 to 25 ft. in height, which strongly resembles the pear-tree in its general appearance, and also in its fruit, which is not unlike the round Burgundy pear. The fruit is a fleshy pericarp, opening by two valves when ripe, and displaying the beautiful scarlet, reticulated arillus, or mace, enveloping the thin, dark-brown, glossy, oval shell which covers the kernel, the *N.* of commerce. Each fruit contains a single seed, or *N.* The *N.* appears to be indigenous to the Malayan Archipelago; all attempts to introduce the fruit into other tropical countries have failed. The Dutch endeavored to extirpate it from all the islands of the Moluccas except Banda, and they had all the trees removed thither for better inspection; but this attempted monopoly was completely frustrated by the mace-feeding wood pigeons. These birds conveyed and dropped the seed beyond the assigned limits, spreading it over the whole of the islands of the Malayan Archipelago. The mace and the *N.* are both valuable spices. The former, although a brilliant scarlet color when fresh, becomes yellow, brown, and brittle when dry. *N.* and mace are employed chiefly as condiments for culinary purposes, for which they are admirably suited by their agreeable taste and stimulating properties. *Imp.* duty: 20 cents per lb.

Oil of N. This spice contains a fixed or solid oil, and a volatile oil, both of which are used for medical purposes. Of the former there are two varieties: the English, which is the best, occurs in pieces of about ¾ lb. in weight, wrapped in leaves of the banana; it has a uniform reddish-yellow color inside; and the Dutch, in larger pieces, wrapped in leaves or paper, and of a lighter color. All kinds are frequently adulterated. *Imp.* duty: 50 per cent.

Nutmeg-Grater, a metal rasp for grating spices, made of different sizes; sometimes in small fancy cases for the pocket.

Nut-Oil, a commercial name for peanut-oil; but oil is obtained from many species of nuts strictly so called, as the almond, hazel, walnut, etc.

Nutria, the commercial name for the fur of the coypu (*Myopotamus coypus*), an aquatic rodent little quadruped of South America. The skin is either dressed as a peltry, or shorn as a hatting fur. See FUR.

Nut-Screw, a tumbler screw.

Nut-Wrench, an instrument for fixing or removing the nuts on screws.

Nux Vomica [Fr. *noix vomique;* Ger. *Krähenaugen, Brechnüsse*], the fruit of a species of *Strychnos*, growing in various places of the East Indies. The fruit (Fig. 376) is about the size of an orange, covered with a smooth, crustaceous, yellow bark, and filled with a fleshy pulp, in which are embedded several orbicular flatted seeds, about ¾ inch in diameter. Nux vomica is inodorous, and its taste, intensely bitter, remains long on the palate. It is known as a very virulent poison, its properties depending on a peculiar alkaloid, called strychnia.

Fig. 376—NUX VOMICA.

O

Oak [Fr. *chêne;* Ger. *Eiche;* It. *quercia;* Sp. *roble, carballo*], an important genus of forest trees, of which there are a great many species. The common European Oak, frequently called the English Oak (*quercus robur*), and the White Oak of America (*quercus alba*), when cut down at a proper age, furnish the best timber known. Some timber is harder, some more difficult to rend, and some less capable of being broken across, but none contains all the three qualities in so great and equal proportions; and thus, for at once supporting a weight, resisting a strain, and not splintering by a cannon-shot, the timber of the *O.* is superior to every other. The larger transverse septa of the *O.* wood are in general very distinct, producing beautiful flowers when cut obliquely. Where the septa are small, and not very distinct, the wood is much the strongest. The texture is alternately compact and porous; the compact part of the annual ring being of the darkest color, and in irregular dots surrounded by open pores, producing, in some kinds, beautiful dark veins. Oak timber has a particular smell, and the taste is slightly astringent. It contains gallic acid, and is blackened by contact with iron when it is damp. *O.* warps and twists much in drying; and, in seasoning, shrinks about $\frac{1}{32}$ of its width. *O.* of good quality is more durable than any other wood that attains a like size. The more compact it is, and the smaller the pores are, the longer it will last. The *O.* is long-lived, and of slow growth. Its wood is largely employed in ship-building, carriage-making, cooperage, cross-ties, etc. The wood of young trees, which is easily divided into splints of great flexibility and strength, is largely used for chair-bottoms, etc. Some prejudice has long existed in Europe against the quality of our oak timber, but it is now conceded by all to be unsurpassed. The white *O.* is found from Canada to Florida and the Gulf States; but as no care has been taken to preserve the forests, the *O.* trees are rapidly disappearing. The live *O.* (*Quercus virens*) is another very valuable American species, found from Virginia to Texas, in the East Indies, etc., but rarely beyond 50 m. from the sea. It is a large, much-branched tree of very slow growth. Its timber, which is yellowish, and fine-grained, is valued above any other in all countries for ship-building. Under the heads of Cork, Quercitron, Valonia, etc., other species and products of the *O.* genus will be found noticed. The bark, leaves, and fruit of all the species abound in astringent matter and in tannin.

Oak-Bark, the bark of the oak, which is largely used for tanning; the inner cortical of young trees being preferred, as containing a larger proportion of tannin. It is peeled from the trees in broad strips about 4 feet in length, and sold by the cord.

Oak-Paper, paper-hangings stained like oak. *Imp.* free.

Oakum, the substance into which old ropes are reduced when they are untwisted, loosened, and drawn asunder. It is principally used in calking the seams, tree-nails, and bends of a ship, for stopping or preventing leaks. *Imp.* free.

Oar, a long piece of timber, round at one end, and flattened at the other, used to make a vessel advance upon the water. The flat part, which is dipped into the water, is called the *blade,* and that which is within the board is termed the *loom,* whose extremity, being small enough to be grasped by the rowers, is called the *handle.*

To push the boat or vessel forward by means of this instrument, the rowers turn their backs forward, and, dipping the blade of the oar in the water, pull the handle forward, so that the blade, at the same time, may move aft in the water. But, since the blade cannot be so moved without striking the water, this impulsion is the same as if the water were to strike the blade from the stern toward the head; the vessel is therefore necessarily moved according to the direction. Hence it follows that it will advance with the greater rapidity by as much as the oar strikes the water more forcibly; consequently, an oar acts upon the side of a boat or vessel like a lever of the second class, whose fulcrum is the station upon which the oar rests on the boat's gunwale.

Oast, a drying-kiln or stove for hops.

Oatmeal, flour made by grinding oats, used for making porridge, bread, and poultices.

Oats [Fr. *avoine;* Ger. *Hafer;* It. and Sp. *avena;* Port. *avea*], a species of grain, the *Avena sativa* of botanists. There are innumerable varieties of this grain. It is the hardiest of all the cereal grasses, growing luxuriantly in cold northern climates, and in coarse mountainous districts, where neither wheat nor barley can be advantageously cultivated. In Scotland it forms a large part of the food of the people, and is far more generally cultivated than any other species of grain. There are four leading varieties of this grain cultivated; viz., white, black, gray, and brown or red oats. The sub-varieties of the white are numerous. That denominated the potato oat, which is very popular both in Europe and in this country, is a large, plump, white grain, so called from having been accidentally discovered growing in a field of potatoes in England. The varieties principally cultivated in this country are the common white, the black, the gray, the imperial, the Hopetown, the Polish, the Egyptian, and the potato oat; but new ones are continually introduced. Oats are largely used as food for animals; they enter but lightly in the manuf. of malt and spirituous liquors. The oat never has entered much in our foreign commerce, as the domestic consumption has always been nearly equal to the quantity produced. The exports (chiefly to Canada, France, and Belgium) for the year 1879 amounted to 5,452,136 bu., valued at $1,618,644. The following table exhibits, for the same year, the product, area, and value of crop in each State: —

States.	Bushels.	Acres.	Value.
Maine	2,412.000	104,869	$1,085,400
New Hampshire	1,550,000	36,046	666,500
Vermont	4,850,000	124.359	2,037,000
Massachusetts	580,000	16,571	295,800
Rhode Island	127,000	3,256	63,500
Connecticut	1,220,000	40,667	719,800
New York	48,000,000	1,371,428	16,800,000
New Jersey	5,250,000	156,716	1,785,000
Pennsylvania	42,400,000	1,177,778	13,568,000
Delaware	415,000	18,043	145.250
Maryland	4,550,000	206,818	1,456,000
Virginia	8,000,000	500,000	2,720,000
North Carolina	3,980,000	256,774	1,830,800
South Carolina	1,020,000	78,461	693,600
Georgia	5,300,000	407,692	3,445,000
Florida	140,000	10,000	133,000
Alabama	1,750,000	145,833	1,032,500
Mississippi	860,000	50,000	602,000
Louisiana	....	....	....
Texas	4,300,000	130,303	1,978,000
Arkansas	1,600,000	66,667	672,000
Tennessee	6,100,000	277,273	2,440,000
West Virginia	3,300,000	132,000	1,023,000

States.	Bushels.	Acres.	Value.
Kentucky............	7,850,000	314,000	$2,669,000
Ohio	28,500,000	890,625	7,980,000
Michigan	16,200,000	437,838	4,860,000
Indiana.............	13,750,000	550,000	3,300,000
Illinois	59,200,000	1,600,000	13,024,000
Wisconsin...........	30,750,000	854,167	7,072,500
Minnesota...........	14,740,000	440,000	4,569,400
Iowa	42,000,000	1,105,263	8,400,000
Missouri............	20,500,000	621,212	4,305,000
Kansas.	12,200,000	321,052	2,196,000
Nebraska............	5,400,000	135,000	810,000
California	1,750,000	70,000	1,277,500
Oregon..............	3,600,000	102,857	1,656,000
Nevada, Colorado, and the Territories.....	2,250,000	72,580	1,350,000
Total	406,394,000	12,826,148	$118,661,550

Object-Glass, Objective, in an optical instrument, the glass at the extreme end which is placed towards the object; the reverse of the lens which is placed against the eye.

Obligation, a bond or indenture, an agreement; a contract with a penalty attached for non-fulfilment.

Oboe, Hautboy, a wind-instrument of the reed kind, which at a very early date took its place as one of the essential instruments of the orchestra. It consists of a tube, made of box, ebony, or cocoa-wood, about twenty-one inches long, narrow at the top, but gradually widening towards the lower end or bell, and divided into three pieces or joints. In the upper and middle ends are holes, by stopping or opening which with the fingers, the natural scale is formed, the intermediate semi-tones being produced by means of the keys, of which some hautboys have but two, while others have fifteen, and sometimes more; they are seldom made now with less than fifteen keys. Its range of available notes extends from B to G in alt. The tone of the hautboy is rich and sweet, and is particularly adapted to *piano* and *dolce* passages.

Observation, in navigation, a sight of the sun, moon, or stars, in order to determine by their altitude, the latitude, and the ship's position.

Obstetrical Instruments, surgical instruments used in assisting delivery, measuring the pelvis opening, etc.

Obverse, the faces of a coin or medal. — In a tool, having the smaller end towards the stock.

Occupation, a business pursuit or livelihood.

Ocean-Steamer, a large sea-going steamship, carrying passengers to distant quarters.

Ochava, a Spanish light weight of 55.47 grains, used for the precious metals; the eighth part of the Spanish ounce and the sixty-fourth part of the marc.

Ochavillo, a dry measure of Spain, the fourth part of the ochavo, a Castilian measure = 0.12565 pint.

Ochavo, a Spanish dry measure, the sixteenth part of the celemin = 0.5026 pint. Also a small brass coin.

Ochre, a native earthy mixture of alumina, silica, oxide of iron, and other substances, found in beds in various places. It is generally of a yellow or brown color, but is sometimes reddened by calcination. It is prepared for use by washing and grinding; and is employed as an ingredient in painters' colors, and in the polishing of metals and stones.

Octava, a Spanish long measure, the eighth part of the vara = 4.1094 inches.

Octave, seven keys on a piano-forte. — A small cask for wine, the eighth part of a pipe.

Octavo, a book folded into eight leaves or sixteen pages to the sheet; usually written 8vo.

Octroi, a small fiscal import duty levied in the French large towns on all goods entering the gates or barriers of the city.

Oculist, a surgeon who attends the diseases of the eye.

Odessa. See RUSSIA.

Odds-and-Ends, miscellaneous things; fragments; scraps; refuse.

Odometer, a road measurer to be attached to carriages, for showing the distance over which the wheels pass.

Odontograph, an instrument constructed to measure, draw, and design the teeth of wheels.

Œuf [Fr.], an egg.

Offal, waste meat or refuse; the entrails of an animal. See at end of article CATTLE (NEAT).

Offer, a bid or tender; a proposal; a price named.

Office, a counting-house; the place of business of a merchant, lawyer, broker, or professional man; a department branch of government administration. — A situation or post of trust; the station or employment of a functionary. — The offices of a detached dwelling-house are the pantry, scullery, wash-house, storerooms, and necessary outhouses, conveniences, and subordinate buildings.

Officer, a man in command; a person appointed to perform some public duty, civil, naval, or military. The classes of *O.* are various, but most of them are mentioned under their specific designations.

Official, derived from the proper office or officer, or from proper authority; made or communicated by virtue of authority.

Officinal, a frequent prefix to the ordinary drugs and preparations of the chemist; implying that they are ready prepared, kept in the shop for sale.

Offing, a good distance from the shore; deep water.

Offset, a contra-account or set-off to a demand made. — The shoot or sucker of a plant. — A surveying staff.

Ogdensburg and Lake Champlain R.R. runs from Rouse's Point to Ogdensburg, N. Y., 118 m., and branches 4 m.; total, 122 m. This Co., located at Ogdensburg, was chartered in 1845 as Northern R.R. Co.; it was reorganized in 1858 as Ogdensburg R.R. Co., which name was changed to the present one in 1864. Capital stock, $5,077,000 (common, $3,077,000, preferred, 8 %, $2,000,000); funded debt, $994,000. Cost of construction and equipment, $5,677,000.

Ogee, or **O. G.**, a species of moulding used by carpenters and cabinet-makers, consisting of two parts, a concave and a convex. — The term is also applied to a pointed arch, the sides of which are formed of two contrasted curves.

Ohio, a central State of the American Union, bounded N. by Michigan and Lake Erie, E. by Pennsylvania and West Virginia, S. by West Virginia and Kentucky, and W. by Indiana. It lies between lat. 38° 27′ and 41° 57′ N., lon. 80° 34′ and 84° 49′ W. Greatest length N. and S., 200 m., greatest breadth E. and W., 225 m. Area, 39,962 sq. m. This State is divided into 88 counties. *Columbus*, the capital, is situated in Franklin Co., on the Scioto, a tributary of the Ohio, about 100 m. N. E. of Cincinnati. It is well laid out on a level site in the midst of an extensive plain, and possesses very broad and handsome streets, pleasantly shaded with elm-trees. Its manufactures are rather miscellaneous, and some of them have

not as yet developed to any great proportions; flour-mills, engineering works, and factories for agricultural implements, brushes, carriages, harnesses, files, and furniture, are among the chief establishments. Pop. 35,000. Cincinnati is the largest city and the commercial metropolis of *O.* (see CINCINNATI). The other cities are Akron (pop. 12,000), Bellaire (5,000), Canton (10,000), Chillicothe (10,000), Circleville (5,000), Cleveland (140,000), Dayton (35,000), Delaware (6,500), Fremont (6,000), Gallipolis (5,000), Hamilton (14,000), Ironton (6,500), Lancaster (5,500), Lima (5,000), Mansfield (10,000), Marietta (6,500), Massillon (6,000), Mount Vernon (5,500), Newark (8,000), Piqua (6,500), Pomeroy (7,000), Portsmouth (13,000), Sandusky (16,000), Springfield (15,000), Steubenville (9,000), Tiffin (6,000), Toledo (35,000), Urbana (5,000), Warren (4,000), Wooster (6,000), Xenia (7,000), Youngstown (9,000), and Zanesville (12,000). Total population of the State, 3,350,000.

This State comprises about one third of the region sloping from the Alleghanies in Pennsylvania down to the Mississippi It possesses no very elevated hill ranges, but consists almost wholly of a table-land elevated from 600 to 1,000 ft above sea-level, the central position of the State being the highest. This, also, which is its least fertile portion, is in parts interspersed with swamps and marshes. The declivity toward Lake Erie is much more abrupt than the S slope of the State, and the country is here also in parts marshy; that portion of the surface which declines towards the *O.*, and is the most extensive, is diversified with hills and valleys, and, on the whole, fully nine tenths of the surface are susceptible of cultivation, nearly three fourths being pre-eminently fertile. The *O.* River, which gives name to the State, washes half of its E and its entire S. border (see OHIO RIVER). The Muskingum, the largest river which flows entirely in this State, is formed by the junction of the Tuscarawas and Walhonding Rivers, and enters the *O.* at Marietta It is navigable for boats 100 m. The Scioto, the second river in magnitude flowing entirely within the State, is about 200 m. long, and enters the *O.* at Portsmouth Its largest branch is the Whetstone, or Olentangy, which joins it immediately above Columbus. It is navigable for boats 130 m. The Great Miami, a rapid river in the W part of the State, is 100 m long, and enters the *O.* in the S W. corner of the State. The Little Miami has a course of 70 m., and enters the *O.* 7 m. above Cincinnati The Maumee, 100 m long, rises in Indiana, runs through the N. W. part of the State, and enters Lake Erie at Maumee Bay. It is navigable for steamboats to Perrysburg, 18 m. from the lake, and above the rapids is boatable for a considerable distance. The Sandusky rises in the N part of the State, and, after a course of about 80 m, enters Sandusky Bay, and thence into Lake Erie. The Cuyahoga rises in the N. part of the State, and after a curved course of 60 m. enters Lake Erie at Cleveland. It has a number of falls, which furnish valuable mill-seats. Besides these, there are Huron, Vermilion, Black, Grand, and Ashtabula Rivers, which enter Lake Erie The geological formations are nearly all secondary, comprising limestone, lias, saliferous and ferriferous rocks, sandstone, graywacke, etc., in horizontal strata. The great bituminous coal-field of Pennsylvania and Virginia projects into the E. and S. E. parts of the State, among the W. foot-hills proper of the Alleghany mountain system, its W. boundary extending from the N. E corner of Trumbull Co, through the cos of Portage, Wayne, Knox, Licking, and Fairfield, to the mouth of the Scioto. The coal-fields cover, in the aggregate, an estimated superficies of 12,000 sq m., extending through 20 cos., and embrace nearly one third of the area of the entire State. The quantity of stove coal mined during the year 1878 was 98,750,537 bushels. Salt-springs are numerous within the carboniferous limits, and large quantities of this mineral are manufactured for market. Iron is found in abundance between the Licking and Muskingum Rivers, near Zanesville, and in the *O.* River near the S. W. corner of Adams Co., and more particularly in the cos. of Lawrence, Gallia, Jackson, Meigs, Vinton, Athens, Hocking, Perry, and Licking. The ore obtained in some of these counties is of very superior quality, being suited to the finer class of castings; it covers an area of about 1,200 sq. m., and has created a very extensive iron interest in the S. part of the State *O.* ranks second among the iron-producing States. The ores chiefly used in the extensive iron manufacture of the N are chiefly obtained from the Lake Superior region. In 1878, 286,886 tons of iron were mined in *O.*, and 397,107 tons were received from other States Petroleum also forms a somewhat important mineral product of the S. E. section of the State; 79,016,958 gallons were produced. Clay, in all its forms, is found in vast quantities, as also carbonate of lime. Hydraulic cement, in large deposits, is known to exist, though it has, as yet, not been made developable Large quantities of building-stone and grindstones are quarried in the N. part of the State, and contribute pretty largely to the industrial economy of the commonwealth. — The climate of N. *O.* is of course colder in winter than the S. and central divisions, yet even here severe weather is not usual. Though the changes in temperature are great and rapid, the constantly varying winds prevent long-continued extremes. — The soil of this State is, generally speaking, of the highest fertility, free from rock or stone, and readily cultivated. There is but a small proportion of the surface unavailable for agricultural production of some sort, or absolutely unfitted for tillage. The valleys of the rivers, and, particularly, of the two Miamis, the Scioto, the Maumee, and their feeders, contain the most fertile and valuable soils. Indeed, it might be difficult to find anywhere lands equalling these in extent, surpassing them in the elements of fertility, or in agricultural capacity. – The Scioto and Miami bottoms contain each an area of about 3,300,000 acres, and together comprise more than one fourth of the superficies of the whole State. The basin of the Muskingum, though less in extent, has much excellent land, while the Maumee bottoms in the N. W., when once thoroughly drained, will be found equal to any in fecundity, being for the most part deep, black mould, with just sufficient sand intermixed to constitute soils of the very highest fertility. Of such a character is the "Black Swamp," in the N. W. of the State, tracts of which have of late years become sufficiently dry for cultivation, and, it is claimed, are the best corn and grass lands. The lake-shores of Erie are of superior adaptation to the growth of fruits, on account of their exemption from pernicious frosts. The peach, so liable to fail in most of the N. States, finds here a congenial atmosphere, while the culture of the grape is, perhaps, more successful than in any other part of the State; in fact, some of the islands of the lake are becoming celebrated for their vinous produce. In an agricultural point of view, *O.* takes a front rank. Wheat, maize, barley, oats, buckwheat, rye, hay, grass-seeds, Irish and sweet potatoes; the various kinds of pulse, with flax, hemp, and other fibrous growths; hops, tobacco; the principal hardy fruits, and cucurbitaceous varieties, with nearly every kind of garden vegetables, are extensively cultivated; maple and sorghum, sirup and sugar, honey and wine, are raised and manufactured in considerable quantities; and horses, cattle, sheep, and hogs are reared in large numbers. The relative value of agricultural produce and live-stock for the year 1879 is given in this work under the names of the principal crops and animals — The number of farms in *O.* under cultivation, as reported by the last census, was 195.953, containing an average of 111 acres each. Total number of acres of land in farms, 21,712,420; of which 14,469,133 consisted of improved lands, 6,883,575 of woodland, and 350,712 of other unimproved soil; the cash value of farms under cultivation, $1,054,465,226, exclusive of $25,692,787 of implements and machinery, amount of wages paid for husbandry during the year, $16,480,778; total value of farm products, $198,256,-907; of orchard stuffs, $5,843,679; of market-gardens, $1.289,-272; of lumber, etc. $2,719,140. — *O* takes a leading position among the States in respect of manufacturing industry. Cotton yarn, cotton and woollen stuffs, iron, glass, cabinet-wares, agricultural implements, paper, boots, shoes, linseed and castor oils, pork (packed), distilled and malt liquors, wines, cooperage, factory cheese, soap, and candles are the principal items Timber, grain, flour, fibre, cattle, tobacco, cured meats, and spirits form the leading articles of exportation The bulk of the great commercial and manufacturing interests centres in Cincinnati. There are in the State 3 customs districts, Miami, Sandusky, and Cuyahoga, whose ports of entry are Toledo, Sandusky, and Cleveland (which see). — *O.* had, in 1879, 167 national banks, having a paid-in capital of $27,794,-469. There were, besides, 17 banks incorporated under the law of the State, with an aggregate capital of $539,904; 23 savings-banks, capital $1,277,500; and 193 private banks, whose aggregate capital was $5,663,898. — The funded debt of the State in 1879 amounted to $6.476,805. The assessed value of taxable property was: for lands (13,025,073 acres), $709,223,985; city and town realty, $381,892,967; chattel property, $461,-460,552; total, $1,552,577,504 The amount of taxes (State and country) levied on valuation was $21,828,069. — The great extent of her canal system, and other internal communications, render *O.* in this respect a rival of New York State. The *O* Canal, commenced in 1832, is 309 m long. extending from Portsmouth on the *O* to Cleveland on Lake Erie, directly connecting the basin of the Mississippi with that of the St. Lawrence, and having several navigable lateral feeders to

Fig. 377. — SEAL OF OHIO.

Columbus, Lancaster, Zanesville, etc. The Miami and Erie Canal, 246 m. in length, from Cincinnati to Toledo, with branch to Indiana State line, 1830; and a continuation of the same, effecting a junction with the Erie and Wabash Canal at Cambridge, Ind; the Mahoning and Beaver, having a length of 77 m. within the State; the Sandy and Beaver; the Walhonding; and the Hocking, are the other chief canals, making an aggregate of 921 m. — The statistics of railroads for the year 1878 were as follows: Length of main line and branches, 4,987 m.; length of sidings and other tracks, 1,277 m.; total length of track with rail in the State, 6,264 m.; amount of capital stock paid in, $157,112,438; amount of funded and other debt, $173,130,592; total of stock and debt, $330,243,-031; number of passengers carried, 16,816,067; tons of freight carried, 31,924,747; gross earnings, $32,277,856; net earnings, $10,521,941; passengers, etc., killed, 194, injured, 367. In 1879 the mileage had increased to 5,151 m., divided into 78 lines, as shown in the following table: —

Companies.	Total length of line.	Total length of line in *O.*
	Miles.	Miles.
Alliance and Lake Erie	23.30	23.30
Ashtabula and Pittsburgh	62.60	62.60
Atlantic and Great Western	422.83	247.82
Baltimore Short Line	31.20	31.20
Baltimore and Ohio and Chicago	262.60	110.31
Bellaire and St. Clairsville	6.50	6.50
Bellaire and South-western	13 00	13.00
Bowling Green	5.50	5.50
Central Ohio	137.29	137.29
Chicago and Canada Southern	67.60	4.50
Cincinnati and Baltimore	5.80	5.80
Cincinnati and Eastern	58.25	58.25
Cincinnati, Hamilton, and Dayton	59.93	59.93
Cincinnati, Hamilton, and Indianapolis	98.40	19.60
Cincinnati and Indiana	20.50	20.50
Cincinnati and Muskingum Valley	148.45	148.45
Cincinnati and Portsmouth	20.40	20.40
Cincinnati, Richmond, and Chicago	36.00	36.00
Cincinnati, Sandusky, and Cleveland	145.66	145.66
Cincinnati and Springfield	80.50	80.50
Cincinnati Street Connection (joint)	2.50	2.50
Cincinnati and White-Water Valley	2.10	2.10
Cleveland, Columbus, Cincinnati, and Indianapolis	391.20	306.60
Cleveland and Mahoning Valley	81.50	81.50
Cleveland, Mt. Vernon, and Delaware	144.04	144.04
Cleveland and Newburg	3.33	3.33
Cleveland, Painesville, and Chardon	7.65	7.65
Cleveland and Pittsburgh	199.77	184.77
Cleveland, Tuscarawas Valley, and Wheeling	101.14	101.14
College Hill	6.57	6.57
Columbus, Chicago, and Indiana Central	580.50	135.90
Columbus and Hocking Valley	105.40	105 40
Columbus, Springfield, and Cincinnati	44.37	44 37
Columbus and Sunday Creek Valley	7.30	7 30
Columbus and Toledo	118.20	118 20
Columbus and Xenia	54.74	54.74
Dayton and Michigan	140.71	140.71
Dayton and South-eastern	69.71	69 71
Dayton and Union	31.74	31.74
Dayton and Western	36.00	36.00
Detroit, Monroe, and Toledo	62.29	7.61
Eastern Ohio	7.75	7.75
Harrison Branch	7.50	7.50
Indianapolis, Cincinnati, and Lafayette	171.50	3.20
Iron	16.50	16.50
Lake Erie and Louisville	110.00	110.00
Lake Shore and Michigan Southern	864 60	369.92
Lawrence	22.04	12 68
Little Miami	99.98	99.98
Mahoning Coal	42.99	42.99
Marietta and Cincinnati	275.20	275.20
Marietta, Pittsburgh, and Cleveland	100.50	100.50
Massillon and Cleveland	12.50	12 50
Miami Valley	41.23	41.23
Newark, Somerset, and Straitsville	44.00	44 00
Niles and New Lisbon	43 35	43.35
North-western Ohio	79.16	79 16
Ohio and Mississippi	615.00	19.53
Ohio and West Virginia	3.00	3.00
Painesville, Canton, and Bridgeport	5.00	5.00
Painesville and Youngstown	61.80	61.80
Paulding and Cecil	5.30	5.30
Pittsburgh, Cincinnati, and St. Louis	200.90	158.20
Pittsburgh, Fort Wayne, and Chicago	468.39	251.80
Pittsburgh and Lake Erie	70.50	10.00
Rocky River	5.53	5.53
Sandusky, Mansfield, and Newark	116.25	116.25
Scioto Valley	100.00	100.00
Springfield, Jackson, and Pomeroy	113.00	113 00
Toledo and Ann Arbor	46.00	6.00
Toledo, Delphos, and St. Louis	50.00	50.00
Toledo and Grand Rapids	6.00	6.00
Toledo and Maumee	7.50	7.50
Toledo, Canada Southern, and Detroit	55 40	7.14
Wabash	600.40	75.50
Waynesville, Port William, and Jefferson	18 00	18 00
Wheeling and Lake Erie	12.50	12.50
Youngstown and Connotton Valley	23.49	23.49

Ohio and Mississippi Railway runs from Cincinnati, O., to East St. Louis, Ill., 340.48 m.; branches, 274.52 m.; total length of line, 615 m. This Co., whose office is at St. Louis, is the consolidation, Nov. 21, 1867, of two corporations, by which the road was built and operated as one line, — the portion from Cincinnati to the Illinois State line as the Eastern, and that in Illinois as the Western Division. The Louisville branch, from North Vernon to Jeffersonville, Ind., 52.52 m., was opened in 1869. The Springfield Division (formerly the Springfield and South-eastern R.R.), from Beardstown to Shawneetown, Ill., 222 m., was bought in 1875 for $1,700,000 in bonds, secured by mortgage on that division. The road was placed in the hands of receivers Nov. 17, 1876. Cap. stock, $24,030,000 ($20,000,000 common and $4,030,000 preferred); funded debt (after deducting assets), $12,841,000; floating debt, $7,168,059. Cost of construction and equipment, $37,651,620.

Ohio River, a large river of the U. States, formed by the confluence of the Alleghany from the N. and the Monongahela from the S. at Pittsburgh, in the W. part of Pennsylvania, lat. 40° 32′ N., lon. 80° 2′ W., at the height of 1,138 ft. above tide-water in the Atlantic. It proceeds in a direction W. S. W., dividing the States of Virginia and Kentucky on the S. from Ohio, Indiana, and Illinois on the N., and enters the Mississippi in lat. 37° N., lon. 88° 58′ W. Its length from Pittsburgh to its mouth, by the course of the river, is 977 m., but the distance in a direct course is only 614 m. It has a descent in its whole course of 395 feet, making an average descent of not quite 5 inches in a mile. The width of the Ohio varies from 400 to 1,400 yards; its average width is 534 yards opposite to Cincinnati, which is about equidistant from Pittsburgh to its confluence with the Mississippi, where it is about 900 yards wide. The great valley drained by this river contains over 218,000 sq. m. There are no considerable falls in this river, excepting at Louisville, Ky., where it descends 22½ ft. in 2 m. These falls have been obviated by a canal around them, which admits of the passage of the largest steamboats; but boats ascend and descend these rapids when the water is high. The current of the Ohio, when low, does not exceed 2 m. an hour; when at a mean height, 3 m.; and when higher and rising, 4 or 5 m. The highest water occurs in December, March, May, and June, and the lowest in August, September, and October. The average difference between high and low water is 40 ft.; its extreme range on record, 64 ft. (at Cincinnati). During 8 or 10 weeks in the winter the navigation is obstructed by floating ice. Of the two confluents which form the Ohio, the Alleghany is the most important, being navigable for boats 260 m. to Olean, N. Y., and, by means of the Genesee Valley Canal, terminating at this place, and extending to the Erie

Canal, forms an important communication between the city of New York and the W. The principal tributaries of the Ohio on the N. are the Beaver, Muskingum, Scioto, the two Miamis, Whitewater, and Wabash; those on the S. are the Kanawha, Sandy, Licking, Kentucky, Green, Cumberland, and Tennessee. Some of these are navigable at high water to a great extent by boats and steamboats. The Tennessee is navigable by boats for 1,000 m.; the Cumberland is navigable for steamboats to Nashville, and for keel-boats 300 m. farther; the Wabash is navigable for 200 m.; Green River, 200 m.; Kentucky, 150 m.; Great Kanawha, 64 m., to the salt-works. The Ohio, with its tributaries, has 5,000 m. of navigable waters. The whole fall of the Ohio from Pittsburgh to Cairo is estimated at 425 ft., and the distance is 977 m. The average fall per mile is, therefore, less than 5 inches. Few rivers of equal length and volume of water have so few falls or rapids impeding navigation as the Ohio. Its fall, however, is not distributed equally over its whole course, as the following table will show: —

	Distance.	Fall.	Average. per mile.
	Miles.	Feet.	Inches.
From Pittsburgh to Wheeling....	88	79	10.77
From Wheeling to Cincinnati.....	374	188	6
From Cincinnati to Louisville.....	156	55	4.2
From Louisville to Falls..........	3	27	100
From Falls to Evansville..........	169	33	2.85
From Evansville to Cairo.........	187	45	2.9

Oils [Fr. *huile;* Ger. *Öl;* It. *olio;* Sp. *aceite*], a term applied to designate a number of unctuous liquors, which, when dropped upon paper, sink into it, and make it seem semi-transparent, or give it what is called a greasy stain. These bodies are very numerous, and have been in common use from time immemorial. Chemists have divided them into two classes; namely, *volatile* and *fixed* oils.

Volatile Oils, called also *essential oils*, are distinguished by the following properties: 1. Liquid, often almost as liquid as water, sometimes viscid; 2. Very combustible; 3. An acrid taste and a strong, fragrant odor; 4. Volatilized at a temperature not higher than 212°; 5. Soluble in alcohol, and imperfectly in water; 6. Evaporate without leaving any stain on paper. By this last test it is easy to discover whether they have been adulterated with any of the fixed oils. Let a drop of the volatile oil fall upon a sheet of writing-paper, and then apply a gentle heat to it; if it evaporates without leaving any stain upon the paper the oil is pure; but if it leaves a stain upon the paper, it has been contaminated with some fixed oil or other. Volatile oils are almost all obtained from vegetables, and they exist in every part of plants, — the root, the bark, the wood, the leaves, the flower, and even the fruit, though they are never found in the substance of the cotyledons; whereas the fixed oils, on the contrary, are almost always contained in these bodies. When the volatile oils are contained in great abundance in plants, they are sometimes obtained by simple expression. This is the case with oil of oranges, of lemons and bergamot; but in general they can only be obtained by distillation. The part of the plant containing the oil is put into a still with a quantity of water, which is distilled off by the application of a moderate heat. The oil comes over along with the water, and swims upon its surface in the receiver. By this process are obtained the oils of peppermint, thyme, lavender, and a great many others, which are prepared and employed by the perfumer. Others are procured by the distillation of resinous bodies. This is the case, in particular, with oil of turpentine, which is obtained by distilling a kind of resinous juice, called turpentine, that exudes from the juniper. Volatile oils are exceedingly numerous. They have been long known, and most of them are given in this work under their specific names. They differ greatly in their properties from each other. — 1. The greater number of volatile oils are *liquid;* many, indeed, are as limpid as water, and have none of that appearance which we usually consider oily. This is the case with the following, namely, oil of turpentine, oranges, lemons, bergamot, roses. Others have the oily viscidity. It varies in them in all degrees. This is the case with the oils of mace, cardamom, sassafras, cloves, cinnamon. Others have the property of becoming solid. This is the case with the oils of parsley, fennel, anise-seed, balm. Others crystallize by slow evaporation. This is the case with oil of thyme, peppermint, marjoram. The oil of nutmegs has usually the consistence of butter. This is the case also with the oils of hops and of pepper. 2. The color of the volatile oils is as various as their other properties. A great number are limpid and colorless, as oil of turpentine, lavender, rosemary, savine, anise-seed; some are yellow, as spike, bergamot; some are brown, as thyme, savory, wormwood; others blue, as camomile, motherwort; others green, as milfoil, pepper, hops, parsley, wormwood, cajeput, juniper, sage, valerian; others, though at first colorless, become yellow or brown by age, as cloves, cinnamon, sassafras. 3. The odors are so various as to defy all description. It is sufficient to say that all the fragrance of the vegetable kingdom resides in volatile oils. Their taste is acrid, hot, and exceedingly unpleasant. 4. Their sp. gr. varies very considerably, not only in different oils, but even in the same oil in different circumstances. — When the volatile oils are heated in the open air, they evaporate readily, and without alteration diffuse their peculiar odors all around; but there is a considerable difference between the different oils in this respect. When distilled in close vessels they do not so readily assume the form of vapor. Hence, they lose their odor, become darker in color, and are partly decomposed. Oils do not seem very susceptible of assuming the gaseous form, unless some other substance, as water, be present.

Fixed Oils are distinguished by the following characters: 1. Liquid, or easily become so when exposed to a gentle heat; 2. Unctuous to the touch; 3. Very combustible; 4. A mild taste; 5. Boiling point not under 600°; 6. Insoluble in water, and nearly so in alcohol; 7. Leave a greasy stain upon paper. These oils, which are called fat or expressed oils, are numerous, and are obtained partly from animals, and partly from vegetables, by simple expression. As instances may be mentioned whale-oil or train-oil obtained from the blubber of the whale and from cod; olive-oil, obtained from the fruit of the olive; linseed-oil and almond-oil, obtained from linseed and almond kernels. Fixed oils may also be extracted from poppy-seeds, hemp-seed, beech-mast, and many other vegetable substances. — All these oils differ from each other in several particulars, but have also many particulars in common. 1. Fixed oil is usually a liquid with a certain degree of viscidity, adhering to the sides of the glass vessels in which it is contained, and forming streaks. It is never perfectly transparent; has always a certain degree of color, most usually yellowish or greenish; its taste is sweet, or nearly insipid. When fresh it has little or no smell. There exists also in the vegetable kingdom a considerable number of bodies which, at the ordinary temperature of the atmosphere, are solid, and have hitherto been considered as fixed oils. Palm-oil may be mentioned as an example. The various substances used in India and Africa as substitutes for butter, and as unguents, may likewise be mentioned. 2. All the fixed oils hitherto examined are lighter than water; but they differ greatly from one another in sp. gr. The same difference is observable in different samples of the same oil. — The drying-oils are used as the vehicle of paints and varnishes. Linseed, nut, poppy, and hemp-seed oils belong to this class. These oils in their natural state possess the property of drying oils, but imperfectly. To prepare them for the use of the painter and varnish-maker, they are boiled for some time in an iron pot, and sometimes burned till they become viscid. When they burn for some time, their unctuous quality is much more completely destroyed than by any method that has been practised. Hence it is followed frequently in preparing the drying-oils for varnishes, and always for printer's-ink, which requires to be as free as possible from all unctuosity. Nut-oil has been found preferable to all other oils for printer's-ink, though the dark color which it acquires during boiling renders it not so proper for red ink as for black. Linseed-oil is considered as next after nut-oil in this respect. Other oils cannot be employed, because they cannot be sufficiently freed from their unctuosity. Ink made with them would be apt to come off and smear the paper while in the hands of the bookbinder, or even to spread beyond the mark of the types and stain the paper yellow.

Illuminating Oils. Fixed oil, when in the state of vapor, takes fire on the approach of an ignited body, and burns with a yellowish white flame. It is upon this principle that candles and lamps burn. The tallow or oil is first converted into a state of vapor in the wick; it then takes fire, and supplies a sufficient quantity of heat to convert more oil into vapor: and this process goes on while any oil remains. The wick is necessary to present a sufficiently small quantity of oil at once for the heat to act upon. If the heat were great enough to keep the whole oil at a temperature of 600°, no wick would be necessary, as is obvious from oil catching fire spontaneously when it has been raised to that temperature. When oil is used in this manner, either in the open air or in contact with oxygen gas, the only new products obtained are *water* and *carbonic acid.* Among illuminating oils are the olive, the variety of it known as Gallipoli, the cocoa-nut, beech-nut, poppy, rape-seed, colza, sunflower, and many other vegetable oils; the fish oils, including sperm-oil and common whale-oil, as well as oils similar to the latter from the seal, porpoise, dolphin, sea-calf, shark, and pilchard; tallow and lard oils; native naphtha, common crude petroleum, and certain oils separated from it by distilla-

tion, as the so-called "gasoline" and refined petroleum, — the last known in the U. States by the trade-name of kerosene, and in Great Britain as paraffin-oil; and similar light and heavy illuminating oils (distinguished in Germany, and on the European continent generally, as photogens and solar oils), obtained by distillation from bituminous shales, lignite, cannel or ordinary bituminous or gas coals, from peat, and from ordinary asphaltum; and other products of chemical combination, of distillation, or of mixture, such as phosgene, rosin-oil, or "carbon-oil," so called, camphene, burning fluid, etc. Some illuminating oils are mainly of local use, and enter comparatively rarely, or in limited quantities, into commerce; while included among them are also palm-oil, illipe-oil, elain, and grape-seed-oil. Still other oils, the use of which for illumination is chiefly local, are some of those of the "drying" sort, and such as, tending rapidly to clog the wicks, are burned by comparatively simple methods, and for a cheap light, as the hemp-seed, cotton-seed, and other similar oils.

Oil-Mill. The various seed-oils are pressed and purified by the following means: — *Screening.* The seeds, laid in a heap, are lifted by a self-acting elevator, and conveyed in small baskets to a flat screen or sifter, to shake out impurities. *Crushing.* When thus sifted, the seeds descend between two heavy iron rollers revolving in opposite directions. Some fruits and nuts require a rasping action instead of crushing. *Grinding.* The crushed seeds are laid upon a bed, and then ground by the action of two heavy edge-stones, which both rotate on their axes and revolve in a circle. Minor adjustments insure the equal grinding of the whole mass, which gradually becomes an oily paste or dough. *Heating.* If the oil is to be hot-drawn, the paste is placed in a vessel heated by steam, and exposed to the action of stirrers or revolving arms, which keep it in motion. *Bagging.* The paste, whether heated or not, is transferred to bags made of strong cloth; and these are placed between other bags called hairs, made of horsehair covered with leather. These hairs are expensive to buy in the first instance, and soon wear out by the heavy pressure to which they are subjected. *Pressing.* The bags of seeds are placed in piles, in such a way that the action of the hydraulic press can be brought to bear upon them. This pressure is enormous, amounting sometimes to 300 tons. Under its influence the oil first separates from the paste, then passes through the cloth bags, then through the hair bags, and then through pipes into a cistern. *Stripping.* After the paste has been pressed dry by the expulsion of the oil, the bags are stripped off from it, and there remains a kind of board or plank of *oil-cake*, available to cattle-feeders. According to the kind of seed, fruit, or nut, and the degree of refining required in the oil, some of the processes may be modified, or others added to the number; but the general routine is as here indicated.

Imp. duty: See under the names of each oil. — Illuminating oils and naphtha, benzine and benzole, refined or produced from the distillation of coal, asphaltum, shale, peat, petroleum, or rock-oil, or other bituminous substances used for like purposes, 40 cts. per gal.

Oil-Bag, a bag of horse-hair, or cocoa-nut fibre, used to press out the stearine from the oleine in fats and oils.

Oil-Beetle, the *Meloe proscarabeus*, an insect from the joints of the legs of which exudes a deep yellow oil, used in rheumatic complaints.

Oil-Cake, the marc or refuse after oil is pressed from linseed, cotton-seed, rape-seed, cocoa-nut pulp, etc., which is extensively used for feeding cattle, and for manure. See LINSEED, and COTTON-SEED (this last in the Appendix).

Oil-Can, a tin vessel for holding oil to supply lamps, etc.

Oil-Cloth, a tarpaulin; canvas for flooring having a thick coat of paint. See FLOOR-CLOTH.

Oil-Color, painters' colors or pigments, formed of mineral substances worked up with oil.

Oil (Cotton-Seed). See COTTON-SEED in the Appendix.

Oiled Leather. See CHAMOIS.

Oiled Paper, transparent paper used for tracing purposes, by surveyors, draughtsmen, and others. The Chinese oiled paper, which comes in packing boxes and as envelopes for Chinese goods, is the common bamboo paper prepared by slightly soaking it in clear oil, and then brushing it over with another coat and drying.

Oiled Silk, silk fabrics which are saturated in oil, to prevent perspiration from passing, used for lining men's hats, ladies' bonnets, etc.

Oil-Mill. See OIL.

Oil-Nut, a name for various butyraceous nuts and seeds yielding oil, as the butter-nut, the ground-nut, cocoa-nut, oil palm-nut, etc.

Oil-Painting, a picture painted with oil-colors, and which may be washed and cleaned, which a water-color drawing cannot be.

Oil-Palm, the *Elais Guineensis*, the fruit of which furnishes the palm-oil of commerce.

Oil-Press, a mill or machine for squeezing out oil from seeds or pulp.

Oil-Refiner and Seed-Crusher, a maker of oil.

Oil-Skin, waterproofed cloth; prepared leather or linen for making garments to keep out the rain.

Oil-Stone. See HONE.

Oil-Well. See PETROLEUM.

Oily-Grain, a name for sesame seed, the *Sesamum orientale.*

Ointment, an oleaginous compound usually having as its basis lard or suet, for smearing, or for dressing sores.

Oitava. See BRAZIL (*Weights and Measures*).

Okatka, a name for bristles in Russia.

Oke, a weight used chiefly in the Levant, which varies, but may be taken to be about 2¾ lbs. In Turkey the quintal or cantaro usually consists of 45 okes, except for cotton, wool, and tin, when it is only 44 okes; in Egypt it is 36 okes. As a measure of capacity in Hungary and Wallachia the oke is about 2½ pints.

Old Colony R.R. runs from Boston to Provincetown, 119.69 m.; Braintree to Kingston, 32.36 m.; South Braintree to Plymouth, 25.94 m.; South Braintree to Newport, 66.66 m.; and Middleborough to Somerset Junction, 10.81 m.; branches, 52.38 m.; total length of lines owned, 301.84 m. This important and prosperous Co., chartered in 1844, and located in Boston, purchased in 1875 the Fall River, Warren, and Providence R.R. which is operated by the Boston and Providence R.R. Co., and is separately accounted for. It possesses also a controlling interest in the Old Colony, and the Nantucket and Cape Cod Steamboat Cos. Capital stock, $6,733,800; funded debt, $5,564,500. Cost of construction and equipment, $11,473,600.

Oldenburg, a N. W. grand duchy of Germany, composed of three separate portions: 1. The Duchy of *O.*, which forms eight ninths of the territory. It is surrounded by the Prussian prov. of Hanover on the E., S., and W., and bounded N. by the North Sea; 2. The Principality of Lübeck, or Eutin, enclosed in the Prussian prov. of Schleswig-Holstein, and the territory of the free city of Lübeck; and 3. The Principality of Birkenfeld, lying in the S. part of the Prussian prov. of the Rhine, on the left bank of the Rhine. Area, 2,417 sq. m. Pop. in 1875, 319,314. *O.* lies in the basin of the North Sea, and is entirely flat. Soil in general fertile, but in several places are extensive sand dunes and marshes. Corn raised insufficient for consumption. Pasturage excellent; horses, cattle, and sheep extensively reared. Manufactures confined to linen-weaving and coarse woollens. Revenue for the year 1879, $1,484,925; expenses, $1,640,560; public debt, $9,284,585. *Oldenburg*, the capital, is situated at the conflux of the Hunte with the Haaren, which here forms a small port, 80 m. W. S. W. of Hamburg. Pop. 15,217.

Old English, a kind of ornamental printing-type.

Old Tom, a kind of strong London gin.

Oleaginous, unctuous; having the quality of oil.

Oleander, a fine shrub, the spurge laurel, *Nerium oleander* (Fig. 378), which has large handsome blossoms. The leaves and bark are used in skin

diseases, and the charcoal of the wood in the East for making gunpowder.

Olefiant Gas, a hydrocarbon obtained by reacting on alcohol with an excess of sulphuric acid. It was liquified by Faraday under great pressure. When mixed with chlorine, it forms an oily body, first discovered in Holland, and thence known as *Dutch liquid*. Mixed with oxygen, it forms a highly explosive mixture. It burns with a brilliant white flame, depositing a large amount of carbon on cold surfaces, and is a more or less large constituent of ordinary coal-gas. It is also known as ethylene.

Fig. 378. — Oleander.

Oleine, the fluid portion of fats and oils, after the stearine or solid part has been removed.

Oleomargarine, a substitute for butter, produced from tallow. It was introduced by the eminent French chemist, M. Mège-Mouries, who, having surmised that the formation of butter contained in the milk was due to the absorption of fat contained in the animal tissues, was led to experiment on the splitting up of animal fat. The process he ultimately adopted, and which is now generally adopted, consists in heating finely minced beef-suet with water, carbonate of potash, and fresh sheep's stomachs cut up into small fragments. The mixture is then raised to a temperature of 113° F. The influence of the pepsin of the sheep's stomach with the heat separates the fat from the cellular tissue. The fatty matter is then removed, and, when cool, is submitted to powerful hydraulic pressure, separating it into stearine and *O.*, which last alone is used for butter-making. Of this fat about the proportion of 10 lbs. with 4 pints of milk and 3 pints of water are placed in a churn, to which a small quantity of arnotto is added for coloring, and the whole churned together. The compound so obtained, when well washed, is in general appearance, taste, and consistency like ordinary butter, and when well freed from water it is found to keep a longer time. According to French official returns artificial butter goes much further as food than the genuine article, and forms a perfectly wholesome dietetic material. *O.* is now so extensively manufactured in the U. States as to seriously interfere with the legitimate product of the dairy. It is not our intention to disparage *O.*, and it can be no doubt that a pure, sweet fat, such as is manufactured by the process just described, is a safer and more wholesome article than the unsavory rancid butter which is so freely sold in our markets to the less wealthy classes. But it is not always the case. Too frequently *O.* is made of the worst fat of the animal in all stages of decay, and it is then unfit to eat, and to sell it as butter is a punishable adulteration. *O.* is not generally accepted as a substitute for butter, and if it was properly labelled it would be impossible to palm it off on the consumer as butter. There is no law to forbid the sale of *O.*, but in some of the States, in New York and Ohio for instance, laws have been passed, permitting its sale only under certain conditions which ought to be strictly enforced. The following is an extract from chapter 475 of the Laws of the State of New York, entitled "An act for the protection of dairymen and to prevent deception in sales of butter": —

> Every person who shall manufacture for sale, or who shall offer or expose for sale, any article or substance in semblance of butter not the legitimate product of the dairy, and not made exclusively of milk or cream, but into which the oil or fat of animals, not produced from milk, enters as a component part, or into which melted butter, or any oil thereof has been introduced to take the place of cream, shall *distinctly and durably stamp, brand, or mark* upon every tub, firkin, box, or package of such article or substance the word "*Oleomargarine*," and in case of retail sale of such article or substance in parcels the seller shall in all cases deliver therewith to the purchaser a written or printed label bearing the plainly written or printed word "*Oleomargarine*"; and every sale of such article or substance not so stamped, branded, marked, or labelled is declared to be unlawful, and no action shall be maintained in any of the courts of this State to recover upon any contract for the sale of any such article or substance not so stamped, branded, marked, or labelled.

Olibanum. See Frankincense.

Olio, a mixture; a medley.

Olive [Fr. and Ger. *olive*; It. *uliva*; Port. *azeitona*; Sp. *aceituna*], a fruit yielding a large quantity of oil, the produce of the *Olea*, or olive-tree. The wild olive is indigenous to Syria, Greece, and Africa, on the lower slopes of Mount Atlas. The species cultivated in Europe grows spontaneously in Syria, and is easily reared in Spain, Italy, and the S. of France. It was introduced before the Revolution in the Atlantic States, and is perfectly hardy and fruitful in South Carolina, where it is, however, little cultivated. It also succeeds well in various parts of California, where large plantations of this tree have recently been made. The fruit is a smooth oval plum, about $\frac{3}{4}$ inch in length and $\frac{1}{2}$ inch in diameter; of a deep violet color when ripe, whitish and fleshy within, bitter and nauseous, but replete with a bland oil; covering an oblong, pointed, rough nut. Olives intended for preservation are gathered before they are ripe. In pickling, the object is to remove their bitterness, and to preserve them green, by impregnating them with a brine of aromatized sea-salt; for this purpose various methods are employed. Olives are eaten before, as well as after meals, and are believed to excite appetite and promote digestion. They are sometimes imported in oil, but more usually in salt brine. The wood of the olive-tree is beautifully veined, and has an agreeable smell. It is in great esteem with cabinet-makers, on account of the fine polish of which it is susceptible.

Olive-Oil. The olive-tree is principally cultivated for the sake of its oil. This is an inodorous, pale greenish-yellow colored, viscid fluid, with a bland oleaginous taste, unctuous to the touch, inflammable, incapable of combining with water, and nearly insoluble in alcohol. It is the lightest of all the fixed oils; and is largely used, particularly in Greece, Italy, Spain, and S. France, as a substitute for butter, especially for frying. In this country, where it is commonly called *sweet oil*, its use as food is reduced to the dressing of salads.

It is extensively used in medicine, and also in the arts as a lubricant.

The ripe fruit is gathered in November, and immediately bruised in a mill, the stones of which are set so wide as not to crush the kernel. The pulp is then subjected to the press, in bags made of rushes; and by means of a gentle pressure, the best or *virgin* oil, flows first; a second, and afterwards a third, quality of oil is obtained by moistening the residuum, breaking the kernels, etc., and increasing the pressure. When the fruit is not sufficiently ripe, the fresh oil has a bitterish taste; and when too ripe it is fatty. After the oil has been drawn, it deposits a white, fibrous, and albuminous matter; but when this deposition has taken place, if it be put into clean glass flasks, it undergoes no further alteration; the common oil cannot, however, be preserved in casks above 1½ or 2 years. The finest oils are said to be produced in Tuscany, but occasionally that of Bari is equal to the Tuscan oil. The finest kind of the latter is called "white sublime oil." It chiefly goes to France. Tuscany oil is shipped from Leghorn in various measures, from pipes of about 110 gallons to the flask of oil with its straw covering weighing about 14 oz. It is adulterated with poppy-seed oil, and probably with other bland vegetable oils. Gallipoli, on the E. coast of the Gulf of Taranto, is the principal port on the Mediterranean for the shipment of Italian oil. *Genoa oil* is a finer kind. *Sicily oil* is of an inferior quality. *Spanish oil* is the worst. One of the most esteemed kinds of oil is that produced at Aix (*Huile d'Aix en Provence*). The foot deposited by *O.*-oil is used for oiling machinery, under the name of *droppings of sweet oil*. In 1879 our imports of *O.*-oil amounted to 336,068 gallons, valued at $458,202, of which France contributed 109,609 gallons, valued at $227,551 (chiefly salad oil), and Italy, 125,146 gallons, valued at $123,210.

Imp. duty: Olives, green or prepared, free. — Oil in flasks or bottles, $1 per gal. — Salad oil, *all*, whether in flasks or bottles, or not, $1 per gal. — Oil, not salad, and not in flasks or bottles, 25 cts. per gal.

Oliver, a small lift-hammer worked by the foot.

Omaha. See NEBRASKA.

Ombre, a kind of damask.

Ombro. See MADDER.

Ombrometer, an instrument for measuring the fall of rain. See RAIN-GAUGE and HYGROMETER.

Omelet-Pan, a cooking utensil for frying egg-cakes.

Omnibus, a long, public, four-wheeled passenger carriage, plying periodically for hire along certain routes in or to large cities; a stage.

Omnium, a term used at the English Stock Exchange to express the aggregate value of the different stocks in which a loan is now usually funded.

Thus, in the English loan of £36,000,000 contracted for in June, 1815, the omnium consisted of £130 3 per cent reduced annuities, £44 3 per cent consols, and £10 4 per cent annuities, for each £100 subscribed. The loan was contracted for on the 14th of June, when the prices of the above stocks were: 3 per cent reduced, 54; 3 per cent consols, 55; 4 per cents, 70: hence the parcels of stock given for £100 advanced were worth —

	£	s.	d.
£130 reduced, at 54	70	4	0
44 consols, at 55	24	4	0
10 4 per cents, at 70	7	0	0
Together	101	8	0

which would be the value of the omnium, or £1 8*s.* per cent premium, independently of any discount for prompt payment.

Onder [Fr.], to water or wave stuffs, etc.

On Draught, malt or spirituous liquors, mineral waters, or other liquids, which, when served or sold are drawn from casks or tanks instead of being bottled.

Onion [Fr. *ognon;* Ger. *Zwiebel;* Port. *cebola;* Sp. *cebolla*], a well-known bulbous plant, *Allium cepa*, cultivated all over Europe and the U. States, for culinary purposes. The small are more pungent than the large; and those which have a tinge of red or purple than those which are white. The Strasburg, Spanish, and Portuguese varieties are the most esteemed.

On Sale, goods held and for sale by a party other than the owner; merchandise left by the owner with another party for sale.

Ontario, a lake of New York and Canada, easternmost and smallest in extent of the five great lakes of N. America. It is between lat. 43° 10′ and 44° N., lon. 76° and 88° W. It receives Niagara River, the great outlet of the upper lakes, in its S. W. part, and has its outlet by the St. Lawrence River in its N. E. part, in which, immediately below the lake, is the cluster denominated the "Thousand Islands." Its shape approaches to a long and narrow ellipse, being 190 m. long, and 55 wide in its widest part, and about 480 m. in circumference. It is in some places over 600 ft. deep, so that its bottom is considerably below the level of the Atlantic. Its surface is 330 ft. below the level of Lake Erie, and 134½ ft. above tide-water. In every part it has sufficient depth of water for the largest vessels. It has many good harbors, and is rarely frozen excepting in shallow parts near the shore.

The principal rivers which enter Lake Ontario from the S. side are the Genesee, Oswego, and Black Rivers, and a large number of creeks. The Bay of Quinte is a long and irregular body of water on its E. part, which receives a considerable river, the outlet of several small lakes, and Burlington Bay is in its W. part. Both these bays are in Canada. It has several important places on its shores, the principal of which are Kingston, Toronto, and Coburg, in Canada; and Oswego, Sackett's Harbor, Port Genesee, or Charlotte, in the U. States. It is subject to violent storms and heavy swells. It is connected with the Erie Canal by the Oswego Canal, and from thence the Erie Canal forms a navigable communication with the Hudson River, a distance of 209 m.; and much of the trade of New York for the West passes through it and through the Welland Canal, which is 28 m. long, with 27 locks, and admits the passage of the largest vessels which navigate the lakes. This canal commences at Sherbroke, near the mouth of Grand River, on Lake Erie, and terminates at Port Dalhousie, on Lake Ontario, 9 m. W. of Niagara village. Its entrance being a considerable distance W. of the outlet of Lake Erie, it is open earlier than the Erie Canal at Buffalo, where the ice often accumulates in the spring. The Rideau Canal forms a navigable communication with the Ottawa River, 126 m. It has 15 light-houses on the American shore, and 13 on the Canadian side.

Onyx. Any stone exhibiting layers of two or more colors strongly contrasted is called an *onyx*, as banded jasper, chalcedony, etc., but more particularly the latter, when it is marked with white, and stratified with opaque and translucent lines. But the Oriental onyx is considered a substance consisting of two or more layers or bands of distinct and different colors. A sard, or sardoine, having a layer of white upon it, would be called an onyx; and according to the number of layers it would be distinguished as an onyx with 3 or more bands. Some of the antique engravings are upon onyxes of 4 bands. An onyx is most valuable when the contrast of colors is strong, and when the layer is thick enough to give a high relief to the object to be engraved. What has, in recent years, been called *Algerine onyx*, or *onyx marble*, is a stalagmitic marble, or transparent limestone, very beautifully varied in color, and quarried in pieces sufficiently large to make statues, chimney-pieces, etc.

Oolong, a peculiar description of very fragrant black tea, possessing many of the qualities of green tea.

Oopack, a black tea, so called from the Chinese prov. or district of that name.

Ooze, soft mud or slime. — A tanner's name for a solution of oak-bark, or other tanning material, in a cistern, in which the hide or skin is immersed.

O. P. These letters, attached to a vessel's name in the books of the Veritas or French Lloyd's, imply that she has no deck.

Opal, a stone, of which there are several varieties, found in different parts of Europe, particularly in Hungary, and in the East Indies, Mexico, Honduras, the Faroe Islands, Georgia, etc. When

first dug out of the earth it is soft, but it hardens and diminishes in bulk by exposure to the air. The *O.* is always amorphous; fracture conchoidal; commonly somewhat transparent. Hardness varies considerably, but less than quartz. Sp. gr. from 1.958 to 2.54. The lowness of its sp. gr. in some cases is to be ascribed to accidental cavities which the stone contains. These are sometimes filled with drops of water. Some specimens of *O.* have the property of emitting various colored rays, with a particular effulgency, when placed between the eye and the light. The *O.* which possess this property are distinguished by lapidaries by the epithet *Oriental;* and often, by mineralogists, by the epithet *nobilis.* This property rendered the stone much esteemed by the ancients. Mr. Emanuel (*Diamonds and Precious Stones*) says of the *O.*, that "it is one of the most beautiful gems in existence: when held between the eye and the light, it appears of a pale milky, reddish hue, but when seen by reflected light it displays all the colors of the rainbow, in flakes, flashes, and sparks; in fact, all the colors of the most beautiful gems are here united in one. When the colors are in small flakes, distributed over the surface, it is termed by jewelers 'harlequin.' This marvellous play of colors is supposed to be occasioned by nearly invisible fissures. *O.* are always cut *en cabochon,* on both sides. They are very brittle, and are always much more brilliant on a warm day. A dealer in precious stones, aware of this peculiarity, invariably holds an *O.* in his hand before showing it, in order to impart warmth to the gem. Fine stones of large size are seldom found; they rarely exceed an inch in diameter." The opal is the only precious stone which defies imitation. It has always been highly prized in the E. For large fine gems as much as $5,000 has been paid. Fine ring or brooch stones bring from $200 to $500. Smaller stones are worth from $1.50 to $100. They are rarely sold by the carat.

Open Account, a running account on a merchant's book, of debts or credits with an individual or firm.

Opener, OPENING-MACHINE a machine for loosening the tussocks of cotton coming from the bale, so that the offal and dust may be removed and the fibres parted.

Opening-Knives, strong blunt metal instruments of various kinds, for opening oysters and tin cans of preserved meats, vegetables, etc.

Open Policy, an insurance policy which covers undefined risks, providing, however, that its terms shall be made definite, especially on the property insured, by subsequent indorsements or additions.

Opera, a musical drama, consisting of recitatives, airs, choruses, etc., combined with scenery, decorations, and action; the building where the representation takes place; the music or words printed and sold.

Opera-Dancer, a ballet-girl or male dancer.

Opera-Glass, a lorgnette; a short single or double telescope for a theatre.

Opera-Hat, a folding hat; a gibus.

Operameter, an attachment to a machine for measuring work done; as the quantity of broadcloth dressed, the copies from a printing-press, etc.

Opera-Singer, a vocalist who takes part in the music of an opera.

Operative, a mechanical workman of any kind.

Operative Chemist, one who has a laboratory, and prepares chemicals himself.

Ophicleide, a kind of trumpet, a loud-toned, brass, serpent-shaped instrument, chiefly used in military music; it forms the bass wind-instrument in a brass band.

Ophthalmic Hospital, a hospital where attention is paid to the cure of diseases of the eyes.

Ophthalmoscope, an instrument for inspecting the interior of the eye, first pointed out by Helmholtz in 1851.

The light which enters the eye is partly absorbed by the black pigment of the choroid, and partly sent back by diffused reflection from the retina through the crystalline lens and pupil. The image of a luminous body as depicted on the retina of another person cannot be seen by us under ordinary circumstances, because, by the principle of reversibility already mentioned as of universal application in optics, the rays which issue from the retinal images are refracted on leaving the eye,

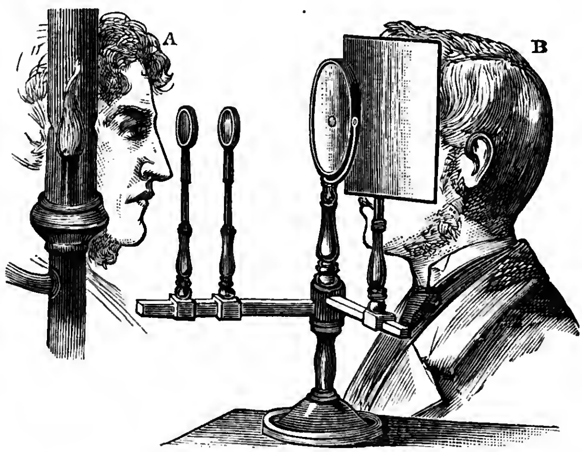

Fig. 379. — RUETE'S OPHTHALMOSCOPE.

and follow the same paths by which they entered it, so that they are sent back to the object. An observer cannot see the retinal image of a candle in another person's eye, unless he allows the rays to enter his own, and this cannot be done directly, because the head of the observer would be interposed between the candle and the eye observed, and the light would then be intercepted. By holding a piece of unsilvered plate glass vertically, we may reflect the light of a candle into the eye of another person, and then the light thrown out from the retinal image of the candle will, on again meeting the surface of the glass, be in part reflected to its source, and in part pass through the glass, on the other side of which it may be received into the eye of an observer (Fig. 379). The positions of the observed (*a*) and observing (*b*) eye may be described as exactly opposite to and near each other, while the candle is placed to one side in the plane separating the two eyes, and the glass is held so that it forms an angle of 45° with the line joining the pupils. Under these circumstances the observer may see the light at the back of the eye, but he will not be able to distinguish anything clearly, because his own eye cannot accommodate itself so as to bring to a focus the rays coming from the retina of the other, since these rays are refracted by the media through which they emerge. But, by means of suitable lenses interposed between the two eyes, the retina and all its details may be distinctly seen and examined. Such an arrangement of lenses and a reflecting surface constitute the *O*, of which there are many forms, but all constructed on the principle just indicated.

Opiate, a soporific; a narcotic.

Opiate Confection, a medicine given in purging, colic, etc.

Opium [Fr. *opium;* Ger. *Mohnsaft;* It. *opio;* Hind. *afeem;* Turk. *madjoon*], the concrete juice of the white poppy (*Papaver somniferum*), which is most probably a native of Asia, though now found

growing wild in the S. parts of Europe. *O.* is chiefly prepared in India, Turkey, and Persia; but the white poppy is extensively cultivated in France and other parts of Europe, on account of its capsules, and of the useful bland oil obtained from its seeds. The poppy is an annual plant, with a stalk rising to the height of three or four feet; its leaves resemble those of the lettuce, and its flower has the appearance of a tulip. When at its full growth, an incision is made in the top of the plant, from which there issues a white milky juice, which soon hardens, and is scraped off the plants, and wrought into cakes. In India, these are covered with the petals of the plant to prevent their sticking together, and in this situation are dried, and packed in chests lined with hides and covered with gunny, each containing forty cakes, and weighing two maunds, or 149½ lbs.; they are exported in this state to the places where the *O.* is consumed. Turkey *O.* is in flat pieces, covered with leaves, and the reddish capsules of some species of *rumex*, which is considered an indication of its goodness, as the inferior kinds have none of these capsules adhering to them. Turkey *O.* has a peculiar, strong, heavy, narcotic odor, and a bitter taste, accompanied by a sensation of acrid heat, or biting on the tongue and lips, if it be well chewed. Its color, when good, is a reddish brown, or fawn color; its texture compact and uniform. Its sp. gr. is 1.336. When soft, it is tenacious; but when long exposed to the air, it becomes hard, breaks with a uniform shining fracture, is pulverulent, and affords a yellowish-brown powder. East Indian *O.* has a strong empyreumatic smell, but not much of the peculiar narcotic, heavy odor of the Turkey *O.*; the taste is more bitter and equally nauseous, but it has less acrimony. It agrees with the Turkey *O.* in other sensible qualities, except that its color is blacker, and its texture less plastic, although it is as tenacious. Good Turkey *O.* has been found to yield nearly three times the quantity of *morphia*, or of the peculiar principle of the drug, that is yielded by East Indian *O.* *O.* is regarded as bad when it is very soft, greasy, light, friable, of an intensely black color, or mixed with many impurities. A weak or empyreumatic odor, a slightly bitter or acrid, or a sweetish taste, or the power of marking a brown or black continuous streak when drawn across paper, are all symptoms of inferior *O.* The amount of *O.* and its extracts imported into the U. States in 1879 was 405,957 lbs., valued at $1,809,696.

O. is chiefly employed with us as a sedative medicine, and for the preparation of morphia, its most abundant and by far important component. But as the drug, when taken in small doses by those unaccustomed to it, communicates a peculiar kind of exhilaration and energy to the mind, as well as a pleasurable condition to the whole system, accompanied with increased capability of exertion, it is largely consumed in the East in much the same way as wine and spirits are taken in Europe. By degrees, as the habit becomes confirmed, the craving increases, and, to produce the desired feeling, the doses must constantly be augmented, till at length, — each excess being followed by depression and torpor, — equal injury is produced as by habitual dram-drinking. In Turkey and Persia, *O.*-eating, once very common, is on the decline, owing to the less rigid observance of Mohammed's injunctions against inebriating liquors; but in China the use of it is on the increase. In the last country, however, it is smoked, a custom less pernicious than eating; owing to the preparation which the drug has to undergo before being fitted for the pipe. Indeed, taken in moderation in this way it is said to have no bad consequences; and in regard to China, it may be observed, that *O.* debauchees do not appear to be more common there than drunkards in other countries. — The U. States Pharmacopœia requires that all preparations shall be made from a powdered *O.*, to avoid the variation in strength that must result from using the crude drug. In medicine, *O.* is chiefly used in the form of liquid preparations, the most important of which is *laudanum*, a tincture prepared with 2½ oz. troy of *O.* to 2 pints of menstruum consisting of equal parts of water and alcohol. About 13 minims of 25 drops of this tincture are equivalent to a grain of *O.* — The lumps of *O.* contain from 1 to 15 per cent of morphia, and the U. States government forbids the importation of *O.* which does not assay 10 per cent of morphia.

Imp. duty: $1 per lb.; liquid *O.*, if medicinal, 40 per cent; *O.* prepared for smoking, $6 per lb.; all preparations or extracts of *O.* n. o. p. f., $6 per lb.

Opobalsam, Balm of Gilead, Judiacum de Mecca, a liquid resin, obtained from the *Amyris Gileadensis*, a tree found in Arabia, Abyssinia, and Syria. It is at first turbid and white, of a pungent smell, resembling turpentine, but sweeter; and of a bitter, acrid, astringent taste. By age it becomes thin, limpid, of a greenish hue, then of a golden yellow, and at length of the color of honey. It is seldom obtained genuine in Europe; the Canada balsam, which is generally substituted for it, answering equally well. In Turkey it is used as a cosmetic. Carpobalsamum and Xylobalsamum are inferior qualities obtained from the fruit and twigs of the same tree.

Opodeldoc, a camphorated soap liniment, used as a remedy for sprains.

Opoponax, an acrid medicinal gum-resin, obtained from the juice of the roots of *Opoponax chironium* in the Levant. In most of its properties it closely resembles assafœtida, and is now seldom used.

Oporice, a conserve of fruits.

Oporto. See Portugal.

Opossum, the *Didelphis Virginiana*, a small marsupial animal found in various parts of the U. States, the skins of which, having a mixed black and white fur, have been prepared for ladies' use. See Fur.

Optical Brazier, a metal worker who furnishes the brass-work and mountings for optical instruments.

Optical-case Maker, a workman who supplies opticians with the wooden or leather cases required to hold or forward optical instruments.

Optical Square, a surveyor's instrument for laying out perpendicular lines.

Optical Turner, a workman who shapes parts of instruments for opticians.

Optician, a maker of, or dealer in, instruments for the eyes, such as telescopes, microscopes, opera-glasses, spectacles, reading-glasses, magnifying glasses, etc.; but who often vends philosophical and other instruments.

Optic-Lens, a ground glass for a telescope, or other optical instrument.

Option, a stock-exchange term for a percentage paid for the privilege of the "put and call"; that is, the liberty to sell or buy stock in a time-bargain, at an agreed price.

Optometer, Opsiometer, an instrument for ascertaining the length of sight in trying spectacle glasses.

Or, the French for gold.

Orache, an old-fashioned pot-herb, the *Atriplex hortensis*, cultivated for its insipid nutritious leaves, which are boiled and eaten as spinach.

Orafo, Orefice [It.], a goldsmith.

Orange [Fr. *orange;* Ger. *Pomeranz;* It. *melaranca;* Sp. *naranja*], the fruit of the orange-tree. The common or sweet orange (*Citrus sinensis* or *Citrus nobilis*), and the Seville, or bitter orange (*Citrus aurantium*), are natives of China; and the Portuguese are entitled to the honor of having transferred the plant to other countries. Particular species of *Citrus* seem to be indigenous to various Eastern countries; but the birthplace of

the proper orange may be distinctly traced to China. *O.* are imported chiefly from Cuba. — The *Citrus aurantium*, or golden-fruited *O.*-tree, under favorable circumstances, usually attains a height of 25 or 30 feet, and is graceful in all its parts. The trunk is upright, and branches into a regular or symmetrical head. The bark of the twigs is of a soft and almost translucent green, while that of the trunk and older branches is of a delicate ash-gray. The leaves are moderately large, beautifully shaped, of a fine healthy green, and shining on the upper sides, while the under sides have a slight appearance of down. The flowers occur in little clusters on the sides of the branches, are pleasing in their form, of a delicate white in the sweet *O.*, and in the more acid varieties slightly tinged with pink. In some plants they have a more powerful odor, and are, for the moment, more rich; but in the *O.*-grove there is a fragrance in the aroma which never satiates nor offends; and as the tree is at one and the same time in all stages of its bearing — in flower, in fruit just set, and in golden fruit, inviting the "hand to pull and the palate to taste" — it is hardly possible to conceive or imagine any object more delightful. There is something, too, peculiar in the organization of the fruit of this tree. The wood of the *O.*-tree, when dry, weighs 44 pounds to a cubic foot, is hard, compact, flexible, slightly odoriferous, and is susceptible of being polished. When recently cut, it is of a yellowish hue, but in the course of time it fades. From its scarcity and small size, it is but little employed in the arts, the only particular uses to which it is applied being to make boxes, dressing-cases, and other articles of fancy; and in Florida considerable quantities of straight, young shoots are cut, and shipped in bundles, to be made into walking-canes. The fruit of the *O.* may be obtained fresh in any region of the globe, and at almost every season of the year. The aromatic oil and the rind preserve it from the effects both of heat and of cold; and the acridity of the former renders it proof against the attacks of insects. It is true that oranges decay, like other fruit; but that does not happen for a long time, if the rind remains uninjured, and they are kept from humidity, and so ventilated as not to ferment. With regard to the quality of this fruit in various places, there appears to be a diversity of opinion. Some consider those of Malta the best; others those of St. Michael's; while others prefer those of Bahia, Havana, or of St. Augustine.

The *Maltese O.* are usually large, the rind thick and spongy, and the glands which secrete the volatile oil are prominent The pulp is red and delicious, although sometimes there is a trace of bitterness in their taste. They are shipped in boxes of an irregular size, and are generally packed in shavings or sawdust. — The *St. Michael's O.* are of a small size, the rind is thin and smooth, the glands small, which secrete but little volatile oil, the pulp light-colored, and of a delicious, sugary taste They are put up in boxes of 350 to 400, with each fruit enveloped in paper, or in the husks of maize. — The celebrated *Navel O.* of Bahia are of difficult transport to Europe and the U States, in consequence of the length of the voyage, and of the humidity and warmth of the climate through which they have to pass. If they are gathered green, however, and suspended in the air above deck, or at the stern of the vessel, in netting, they will endure through the voyage — The *Havana O.* are usually of a good size, with a moderately rough rind, and a pulp well filled with delicious juice. From the shortness of the voyage to any of the American markets, they may be safely transported during the winter months. The fruit is ripe in Cuba at the end of October, and is usually shipped in barrels of 250 to 400 fruits in each, put up loosely, without any envelopes.

The *St. Augustine O.* are superior, both in size and quality, to those of Cuba or the Mediterranean. They resemble those of Havana in flavor, but are much larger, and bring from 20 to 30 per cent more in the New York and Boston markets. Of the smaller sizes, it requires about 300 fruits to fill a barrel, but of the largest ones only 100 are necessary. — In Europe, the *Valencia O.* are eagerly sought after, on account of their early appearance, large size, and beautiful color. They are put up in boxes of 220 to 240 fruits in each, enveloped in brown paper. — The *Sicilian O.* and those of the South of Italy may be regarded as nearly of the same quality. They are of a medium size, with a fine color, and are rather acid in their flavor. Those shipped from Messina are put up in boxes of 200 to 210 fruits in each, and those of Palermo. which mature later, are shipped in boxes of 300 or more fruits in each. — "In this country the *O.* is cultivated as an object of profit in Florida, Louisiana, and S. California; Texas and some other states produce a small number for home consumption. In various parts of Florida, south of lat. 30°, especially along the St. John's and Indian rivers, there are immense groves of wild *O.* So thoroughly established is the tree, and so generally is it distributed, that many have supposed it to be indigenous; but botanists who have investigated the matter regard it as an instance of remarkable naturalization, and the trees as having descended from those which are known to have been introduced by the early Spanish colonists. This wild *O.* is bitter, often called in Florida the bitter-sweet, and so exceedingly fruitful that a tree in full bearing is an object of great beauty; the wild *O.* furnishes stocks on which to bud other varieties, and the fruit is used to make marmalade. In Florida there are three methods of establishing an *O.*-grove: to clear up a wild grove, removing all trees not needed, and budding with sweet fruit those that remain; to take up young wild trees and set them in prepared ground, and there bud them; and to raise stocks from seed, bud them in nursery rows, and when of sufficient size set them in the plantation, as is practised with other fruit. Each method has its advocates, and it is probable that the last named, though apparently slower, gives ultimately better results. Some maintain that there is no need of budding stocks raised from the seeds of sweet *O.*, but that the fruit reproduces itself perfectly from the seed. Almost any soil that is not a heavy clay suits the *O.*, but in a light sandy one fertilizers must be applied Severe frosts are fatal to the tree; in 1835 occurred a frost of such severity as to kill not only cultivated trees, but those in the wild groves Insects of various kinds, especially a *coccus* or scale insect, are destructive; a kind of fungus affects the fruit and leaves; and there is another disease, not well understood, which causes the death of young growing shoots. None of these are regarded as formidable, if the trees have proper and timely attention, but if neglected, the value of the grove is soon destroyed. The Jesuit missionaries early introduced the *O.* into the gardens of the mission stations of S. California, and some of these, notably that of Los Angeles, were in full bearing at the time the country came into our possession. The American settlers soon extended the culture of *O.*, lemons, and such fruits, and it is now one of the principal industries of Los Angeles and its vicinity, and has extended to other parts of the State." (*The American Cyclopædia.*)

Imp. duty, 20 per cent Flowers or buds, free Peel, candied, 35 per cent; not preserved, candied, or otherwise preserved, free.

Orange-Color, a color composed of equal parts of red and yellow.

Orange-Peel, the rind or outer skin of the orange, used by confectioners in various ways, and imported in considerable amount. Orange-peel is usually put up in casks, and the principal shipments are from Jamaica.

Orange Pekoe, a kind of Chinese black tea, resembling pekoe; it contains much dust, and the lower grades have brown and dark leaves mixed with the white-tipped yellowish leaves of the better grades.

Orange-Pippin, a kind of apple.

Oratorio, a vocal representation of some Scripture story.

Orcanett. See ALKANET.

Orchard, an enclosure devoted to the cultivation of fruit-trees; a plantation of apple, plum, or cherry trees, etc.

Orchestra, an enclosed place for musicians in a theatre, immediately in front of the foot-lights of the stage; a balcony or raised gallery in a ballroom; collectively, the instrumental performers themselves.

Orchestron, ORCHESTRINA, a musical instrument lately invented, somewhat resembling a small harmonium, and constructed of different pitches, corresponding to the violin, violoncello, clarionet, horn, etc.

Orchids, curious ornamental plants esteemed by cultivators. The roots of some form the agreeable diet called salep.

Orchilla Weed, ORCHELLA, ORCHAL, ARCHIL [Fr. and Ger. *orseille;* It. *oricello;* Sp. *orchilla*], a whitish lichen (*Lichen orcella*) imported from the Canary and Cape de Verd Islands, Madeira, Barbary, and the Levant. From it is obtained the archil, or orchal, of commerce, which yields a rich purple tincture, fugitive, indeed, but extremely beautiful. The preparation of orchilla was long a secret, known only to the Florentines and Hollanders; but it is now extensively manufactured in England. Orchil is generally sold in the form of cakes, but sometimes in that of moist pulp; it is extensively used by dyers. *Imp.* free.

Order, a direction in writing to pay money or to deliver merchandise; the specific direction for certain kinds and certain quantities of goods to be sent or shipped to the party ordering, which order may be verbal or in writing.

Order-Book, a book for entering roughly the orders of customers, or directions for purchase.

Ordnance, a name for cannon and all descriptions of large guns.

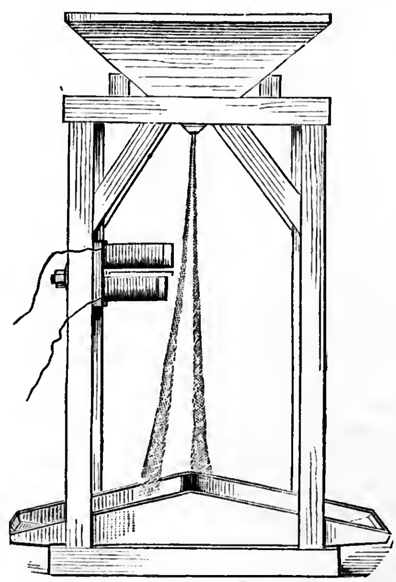

Fig. 380. — EDISON'S MAGNETIC ORE-SEPARATOR.

Ore, a crude mineral or metal as found in the earth.

Ore-Dressing. This comprises such preparatory operations in Metallurgy as do not require the application of heat or the use of furnaces. In some metals, such as iron, the product would not pay the cost of much dressing; while in others, such as copper, the value of the metal offers encouragement to a good series of preparatory processes. Again, some metals are easily separated from the gangue (stony impurities) of the ore during smelting; whereas others cannot be so without previous dressing. Hence ore-dressing assumes different forms under different circumstances. In the first place the miner usually separates the coarser and most cumbrous gangue while in the mine, in order to not send up to the surface too large quantity of useless matter. Then, on the ground above, women and children, by means of hammers, separate the ore into three heaps, — useless gangue, ore rich and clean enough to go at once to the smelter, and ore of an intermediate kind requiring dressing. The last-named class is that to which the processes of ore-dressing are chiefly applied; and these vary with the nature of the metal. — For *Copper*, the fragments of selected ore are crushed under large cast-iron cylinders, and screened in a large, wire-gauze cylinder, until brought to rather a fine condition. For *Lead*, the ore is first sorted into three kinds, called *knockings*, *riddlings*, and *fell*, according to the size of the pieces; and these require different degrees of crushing and pulverizing. The ore is next passed between a pair of fluted rollers, and then down an inclined plane to a pair of smooth iron cylinders; the cylinders finish the crushing which the rollers began. The cylinders may be brought nearer or farther apart, according as need requires. Another pair of cylinders is used for the inferior kinds of ore called *chats*. Sometimes the gangue is too hard to yield to the rollers, and then the stamping-mill is employed. — For *Tin*, the amount of dressing required is much greater than for copper or lead. The large pieces of ore are broken moderately small by hammers, and the pieces too poor to be worth smelting are picked out and thrown aside. The good pieces are then crushed by an *ore-mill*, *stamping-mill*, or *disintegrator*. This consists of 20 to 50 wooden beams called *stampers*, 10 feet long by 8 inches square, shod at the lower end with $1\frac{1}{2}$ to 4 cwt. of cast-iron; the stampers are worked up and down by cogs in a large wheel moved either by water-power or steam-power. The ore, placed beneath, is crushed by the repeated blows of these formidable stampers, an abundant supply of water being furnished to aid the process. The ore passes through gratings into troughs, when it is separated into *slime*, *crop*, and *leavings*, according to the size. Further separation is made between qualities and sizes by numerous processes of washing, shaking, and sifting; the result of this is, that a large proportion of stony and earthy matter is driven away, leaving the ore rich in tin. The chief operations of smelting, after the ores have been dressed, are treated under the names of the metals. See also SMELTING. The ore-dressing (if it may be so called) of gold is described under GOLD. Since this article was prepared, however, Mr. Edison has patented (1880) a *magnetic gold ore separator*, the principle of which is illustrated in Fig. 380. It is intended for working tailings which are now thrown away as being too poor to pay the working by any of the ordinary methods. The concentration is effected by allowing the sands to fall in front of the face of a large electro-magnet. The magnetic attraction changes the trajectory of the falling magnetic sand without stopping its fall, so that while the silicious sand, gold, and other non-magnetic substances fall straight down into one compartment of the receiving hopper, the trajectory of the magnetic sand is changed so that it falls into another compartment of the receiving hopper. By this means the separation of the black sand is rapidly and completely effected with the expenditure of very little labor.

Oregon, a N. W. State of the American Union, bounded N. by Washington Territory, E. by Idaho, S. by Nevada and California, and W. by the Pacific Ocean, with a coast-line of more than 300 m. It lies between lat. 42° and 46° 20′ N., lon. 116° 40′ and 124° 35′ W.; its greatest extent, N. and S., being about 275 m., and E. and W. 350 m.; area, 95,274 sq. m. The State is divided into 23 counties. *Salem* (pop. 2,000), the capital, is on the E. bank of the Willamette, 50 m. S. of Portland. Pop. of the State about 125,000.

The State may properly be divided into two distinct parts, so far as relates to climate and agricultural capacities, viz. the *eastern* and *western*, lying respectively on the E. and W. sides of the Cascade Mountains, which extend from the N. to the S. boundary, the Columbia River running nearly parallel with the coast at a distance therefrom of about 110 m. The Coast Range of mountains, commencing at the Bay of San Francisco, extends N. through the States of California and *O.* In this State they consist of a series of highlands running at right angles with the coast, with valleys and rivers between, the numerous spurs having the same general direction as the highlands. — *Western O.*, the portion of the State first settled, embraces about 31,000 sq. m., being nearly one third of the area of the whole State, and contains the greater preponderance of population and wealth. Nearly the whole of this large extent of country is valuable for agriculture and grazing; all of the productions common to temperate regions may be culivated here with success. When the land is properly cultivated, the farmer rarely fails to meet with an adequate reward for his labors. The fruits produced here, such as apples, plums, pears, quinces, and grapes, are of superior quality and flavor. Large quantities of apples are annually shipped to the San Francisco market, where they usually command a higher price than those of California, owing to their finer flavor. The valleys of the Willamette, Umpqua, and Rogue Rivers are included within this section of the State, and there is no region of country on the continent presenting a finer field for agriculture and stock-raising, because of the mildness of the climate and depth and fecundity of the soil. *Eastern O.*, extending from the Cascades to Snake River, has a much drier climate than the region W. of the Cascades, and is more subject to extremes of heat and cold; the major part of the soil is not available for tillage, yet furnishes an extensive scope for grazing. Along the Columbia River, in the valleys of the Umatilla and Walla-Walla Rivers,

the soil is highly fertile, and the agricultural capacity excellent. Many thriving settlements, with extensive improvements in manufacture and agriculture, exist in this portion of the State. — The Columbia, Willamette, Snake River, and Clark's Fork are the principal navigable streams, and are successfully traversed by steamboats. The first-named, forming the chief part of the N. boundary of the State for about 300 m., and one of the largest and most important rivers on the continent, passes through some of the grandest and most picturesque scenery in the world. It is navigable for steamboats for above 300 m., with portages of 6 and 15 m. at the Cascades and the Dalles respectively, around which railroads have been constructed. Ships ascend 115 m. above its mouth. The Willamette rises in the Cascade Range and joins the Columbia 120 m. above its mouth, after a course of 155 m. It is navigable by sea-going vessels 18 m. above Portland. The only obstacle to the free navigation of this river is a fall of 40 feet at Oregon City, which is now overcome by locks constructed at a cost of $450,000. Vast quantities of delicious salmon of many varieties abound in the Columbia and its tributaries, forming an important article of commerce, which may be indefinitely increased to meet almost any imaginable demand. These fish make a fall and spring run from the ocean, penetrating most of the Oregon rivers to the smaller branches from which they flow, and stem the powerful current of the Columbia for more than 1,000 m. — The mineral resources of the State, though not so extensively prospected as those of adjacent States and Territories, are both extensive and valuable, and will, doubtless, at some future time, form a prominent source of wealth. Placer mining has been carried on extensively and profitably in the S. counties since 1852, and the mines of John Day and Powder Rivers have yielded several millions of dollars since their discovery in 1860. The annual product of the mines, until 1868, was from $1,500,000 to $2,000,000, but is now only about $1,000,000. In common with the surface deposits elsewhere, there is a gradual diminution as the placers become exhausted; new discoveries, however, are being continually made. Numerous gold-bearing quartz lodes have been discovered in various parts of the State, but none of them, thus far, have been mined to any developable extent. East of Eugene City, near the N. branch of the Willamette, some excellent lodes have been prospected. The Blue Mountains in the vicinity of Cañon City, John Day River, abound in paying quartz. By far the most important mineral yet discovered in the State is the vast deposit of iron known to exist between the Willamette River, above Portland, and at the Columbia, at St. Helen's. Of the entire extent of this valuable deposit there is, as yet, but imperfect knowledge, but it has been traced for a distance of at least 25 m., and is, most probably, inexhaustible. Copper has been found in the Calapooya Mountains, near the central portion of the State. The specific area of the Oregon coal-field is estimated at 600 sq. m., viz.: anthracite, 100; bituminous, 500. — The soil in the valleys of the Willamette, the Umpqua, and Rogue Rivers is very rich and deep, resting upon a substratum of clay retentive of the elements of fertility. Large portions of these valleys are open prairie, just rolling enough for the requirements of agriculture. All the products common to temperate regions, whether of the field, orchard, or garden, can be cultivated with the highest degree of success. The chief products of field husbandry are wheat, oats, barley, rye, hay, maize, buckwheat, flax, hemp, sorghum, pease, beans, millet, broom-corn, pumpkins, and potatoes; of the garden, turnips, squashes, tomatoes, cabbages, onions, cucumbers, gourds, beets, carrots, and parsnips; and of the orchard, apples, pears, plums, cherries, apricots, quinces, peaches, and grapes. The relative value of agricultural products is given in this work under the names of each of the principal crops. Heretofore the State has suffered from the limited accommodation of desirable markets for grain and produce, thus retarding her growth and wealth: but by the liberal and intelligent management of steam-navigation companies, and the late completion of railroads around the Upper and Lower Cascades in the Columbia River, the State is being rapidly developed, and was never so prosperous as at the present time, commerce steadily increasing, and grain being shipped direct to England. Regular lines of transportation are established to New York and other cities on the Atlantic seaboard, and others are proposed to Australia, China, and Japan. *O.* is divided into three customs districts: Southern *O.* (port of entry, Coös Bay), *O.* (port of entry, Astoria), and Willamette (port of entry, Portland). The two principal ports, Portland and Astoria, are given below. In 1879 *O.* had 3 lines and 282 m. of railroad in operation: Oregon Central, from Portland to St. Joseph, 48.61 m.; Oregon and California, from Portland to Rosebury, 199.10 m.; and Willamette Valley, from Dayton to Dallas, 35 m. There was at Portland a national bank with a paid-in capital of $250,000. The public debt of the State was $320,029; assessed value of real estate and personal property, $42,240,324; tax per capita, $2.46.

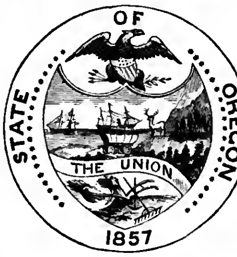

Fig. 381. — Seal of Oregon.

Astoria, a port of entry, capital of Clatsop Co., on the S. bank of the Columbia River, about 10 m. from its mouth, and 70 m. N. W. of Portland. The difficulties in the entrance to the Columbia are a great check to its development. Its imports, for the year 1879, amounted to $2,152; and its exports to $1,854,144, consisting chiefly of wheat, wheat flour, and fish. In that year 50 vessels of 2,566 tons belonged to the customs district. 6 vessels of 7,349 tons entered, and 18, of 18,285 tons, cleared, the port in the foreign trade; 216 vessels of 380,299 tons entered, and 203, of 369,923 tons, cleared, in the coastwise trade. Pop. 2,000.

Portland, a port of entry, cap. of Multnomah Co., and the chief city of the State, on the W. bank of the Willamette river, 12 m. above its mouth in the Columbia, and 122 m. from the sea, in lat. 45° 30′ N., lon. 122° 27′ W. It is the head of ship navigation; its commerce is very brisk, and its manufacturing interests are rapidly growing in importance. There are 5 iron-foundries, 3 saw and planing mills, 3 breweries, 2 nail-factories, etc. Portland has a national bank, with a capital of $250,000, and 3 other banking establishments with an aggregate capital of $1,500,000. In 1879 there were 87 vessels of 35,122 tons belonging to the port. The imports amounted to $364,635, and the exports (chiefly wheat, wheat flour, fish, and lumber), to $3,105,290. During the same year 16 vessels of 11,496 tons entered, and 65 vessels of 56,904 tons cleared, in the foreign trade; while in the coastwise trade 125 vessels of 203,193 tons entered, and 102 vessels of 187,746 tons cleared, the port. Pop. 15,000.

Oregon and California R.R. runs from Portland to Roseburg, Oregon, 199.10 m. This Co., which succeeded the Oregon and Central R.R. Co., of Salem, and owns its land-grant, was organized in 1870, and the road was opened in 1872.—Funded debt, consisting of 1st mortgage, 7% bonds, due April 1, 1890, $10,950,000. Cost of construction and equipment, $5,603,356. Address of the Co., Portland, Oregon.

Oreillons [Fr.], parings of skins, etc.

Orejon [Sp.], a sun-dried peach.

Oreria [It.], gold plate.

Orfèvre [Fr.], a goldsmith or jeweller.

Orfroi [Fr.], broad bands or welts of gold lace or fringe.

Organ, a large, complicated, powerful musical instrument, chiefly used in places of divine worship and in concert halls, in which the sounds are produced by a number of pipes of different lengths, sizes, and materials, supplied with compressed air conveyed from a bellows, and operated by keys and stops moved by the performer. The invention of the *O.* is attributed to Archimedes, about 220 B. C., but the fact does not rest on sufficient authority. The *O.* was brought to Europe from the Greek empire; it was first applied to religious devotion in churches in 658 A. D., and St. Jerome mentions an *O.* with 12 pairs of bellows, which might have been heard a mile off. The *O.*, admittedly the noblest of musical instruments, involves much more scientific action than the pianoforte. The latter strikes a stretched string with a hammer, the former blows a column of air through a pipe, thereby adding the philosophy of pneumatics to that of mechanics. During more than a thousand years the church *O.* has been undergoing incessant improvements until at length it has become a mass of mechanism at once formidable and delicate. The introduction of the pneumatic lever is the most important of recent inventions connected with *O.* building. This lever was first completed in Paris, in 1840, by Mr. Baker; and it has since been brought by American *O.* builders to such an admirable state of perfection that, by the pressure of a small knob within reach of the performer's fingers, whole combinations of stops can be drawn out or pushed in, and the changes from fortissimo to pianissimo made almost instantly and by a single touch.

The application of electricity to the *O.* is now occupying attention. Many advantages would often result if the key-board could be placed at pleasure in positions distant from the serried ranks of pipes, above or below them, before or behind them, to the right or the left, etc. So long as the connection is purely mechanical, this cannot very easily be accomplished; but there is some ground for believing that this difficulty will gradually be obviated. As electricity will convey messages to great distances through a submarine cable or a land wire, so may the organ-player's wishes be conveyed from the key-board to the pipes. Several church *O.* have been made, in which a cable of insulated wires is placed in connection at one end with the key-board, and at the other with the pipes, each wire transmitting the musical message from one key to one pipe. The hope of the inventor is, that all the delicate lights and shades of *O.*-playing may be preserved by this mechanism; but this is a matter which can be determined only by long experience. The greatest *O.* in the world is probably that constructed in 1870 for the new Royal Albert Hall of Arts and Sciences in London, which has 111 complete registers, 138 stops, and nearly 10,000 metal pipes. The wind is supplied by steam-power. The largest *O.* in America has 4 manuals, 89 stops, and 4,000 pipes; it was built by Walcker, of Ludwigsburg, for the Music Hall at Boston. All of the church *O.* in this country are now constructed by American builders. The instrument known in America as *Alexander O.*, and in France as *Orgue-Mélodium* or *Piano-Liszt*, belongs to the reed series of musical instruments, and is substantially constructed on the principle of the harmonium. *Imp.* duty: 30 per cent.

The structural essential parts of an ordinary church *O.* are as follows: *The Pipes.* All the sounds of an *O.* are produced by or in *pipes.* Some of these pipes are of wood, and square in section; some are of metal, and cylindrical. The upper end of some is open, while that of others is closed with a plug called a *tompion.* The lower end of some has an opening or *mouth;* that of others an apparatus called a *reed.* All these differences affect both the pitch and the quality of the sound emitted. The longer the pipe, the deeper the tone; a closed pipe emits a sound an octave lower than an open pipe of the same length; a mouth-pipe produces the sound in some such way as that of a flute is produced, whereas the reed-pipe has a vibrating tongue like a clarionet. The pipes vary from 6 inches to 32 feet in length, and the kind of wood or metal employed determines whether the sound will be brilliant or mellow. — *The Stops.* This is rather an inconvenient name for the thing denoted. A *stop* is a set of pipes, from low notes graduating through medium up to high notes, all having the same *quality* of tone. This quality may vary with wood and metal pipes, square and cylindrical pipes, open and closed pipes, mouth and reed pipes; but the quality is the same for all the pipes in the same stop. Sometimes the stop is denoted by certain figures, sometimes by words supposed to be descriptive of the quality of sound, — such as *flute, oboe, clarionet, trumpet, bassoon, cremona, dulcinea, vox celeste, vox humana, diapason, principal, clarion, cornet,* etc. — *The Keys* If there were only one pipe to each key, the key-board would be as simple as that of the piano-forte; but the several stops or sets of pipes require two or more key-boards for their management. Technically, the name *organ* is given to a key-board and the particular stops which it governs; thus there are the *great O.*, the *choir O.*, the *pedal O.*, and the *swell O.*, or *swell*, each governing a certain number of stops. By pulling out or thrusting in a small handle or plunger, any one stop may be put into or out of play. The number of key-boards as well as the number of stops depends on the magnitude and completeness of the instrument. The *pedal* keys are pressed by the feet, the *manual* by the hands. — *The Bellows.* The pipes "speak" or sound by the keys opening a communication between them and a space filled with compressed air. The *bellows* are very varied in action, but usually bear some kind of resemblance to large forge-bellows, with lever-boards, elastic leather sides, and a nozzle or mouthpiece. Manual power forces air by means of the bellows into a *wind-chest*, where the air is condensed in proportion to the pressure applied. When the keys are pressed down, they open certain passages in the wind-chest, and the air, rushing out, passes into and through the pipes, enabling each to give forth its proper sound. In very large *O.*, additional power is needed to force in an adequate supply of wind.

Barrel O. — Poor as it is in a musical sense, this mechanical instrument is really more complete than a keyed *O.* of equal size, owing to the nicety required in studding the barrel. There is no key-board. There is a barrel, the surface of which is studded with metal pins or wooden studs. These pins, confused as they appear, are arranged strictly in accordance with some particular melody. When the barrel revolves, the pins strike against certain levers, which open air-passages leading to the pipes, and thus the pipes are made to sound. Some of the barrels are rotated by turning a handle, some by spring clock-work: and this power, whichever it may be, is also made available for working the bellows. In most barrel *O.*, the barrel is large enough to accommodate more than one tune; in this case a catch or slide puts into action just that set of pins or studs which belongs to the tune to be played, and places the others temporarily out of gear. A *musical-snuff-bin* may be regarded as a small barrel *O.* with clock-work action instead of a handle, and vibrating tongues instead of pipes.

Organdi, a clear or checked muslin for ladies' dresses.

Organ-Harmonicon, a large harmonium or cabinet organ.

Organist, the instrumental performer who plays on an organ.

Organzine, a kind of silk which has been twisted or thrown twice, the first twist being like the yarns which form a strand, and the second like the strands which form a rope; thus constituting a hard and compact thread, which is used as the warp or long threads for the same kind of goods as those which have tram in the weft. Organzine is used for tulle blondes, for ribbons, for plush, and for satin.

Orge [Fr.], barley.

Orgeat, a sweetened emulsion of almonds, usually flavored with a few bitter almonds and a little orange-flower water. Mucilage of gum-arabic is also sometimes added. It is both used as an agreeable sirup to mix in certain drinks, and medicinally as a mild demulcent.

Orient, a fire-insurance Co., located in Hartford, Conn., organized in 1867. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; surplus beyond all liabilities, $146,298. — Risks in force, $24,764,441; premiums, $279,240. Premiums received since the organization of the Co., $2,581,303; losses paid, $1,333,426; cash dividends paid to stockholders, $345,000.

Oriental, a term applied to many precious stones without any reference to the country of production.

Origanum Oil, an essential oil obtained from the leaves of *Thymus vulgaris*, the oil of thyme of the shops; a common remedy for the pain of carious teeth, and also used as a liniment.

Original, a first copy; that from which a thing is copied.

Orleans, a cloth made of worsted and cotton, used for dresses, etc.

Ormolu. See GOLD (DUTCH).

Ormolu-Varnish, a copper, bronze, or imitation-gold varnish.

Ornament, a decoration or embellishment; a jewel.

Ornamental, a name for a variety of decorated printing-types.

Ornamentor, a decorator; a finisher of articles.

Orpiment, a musical instrument constructed on the melodeon principle.

Orpiment, or yellow sulphuret of arsenic, generally occurs massive and lamellar, of a bright lemon or golden color, sometimes running into red or brown; soft and flexible, but not elastic; insoluble in water, and inodorous. Sp. gr. 3.5. It is a natural product of China, South America, and other countries. The finest, called golden *O.*,

comes from Persia. Artificial *O.* is manufactured chiefly in Saxony; it occurs in the form of a yellow powder. This substance is commonly employed in dyeing and calico-printing, but the finer native varieties are reserved for artists. It is often adulterated with king's yellow, an ill-made poisonous compound, frequently containing nothing else than white arsenic and sulphur; it is quite soluble in water. The name red *O.* is sometimes given to realgar.—*Imp.* free.

Orrery, a planetary; a representation, on a small scale, of the revolutions of the planets.

Orris, a peculiar pattern in which gold and silver lace is worked. The edges are ornamented with conical figures placed at equal distances, with spots between them.

Orris-Root, the fragrant, bitterish, acrid rhizomes of two species of Iris (*I. Germanica* and *I. Florentina*). It is employed in scenting violet-powder, hair-powder, and articles of perfumery, and for flavoring liqueurs.

Orsedew, leaf metal sometimes called Dutch gold. It is imported in small boxes or in papers containing 5 books, of about 21 leaves each.

Orseille. See ARCHIL.

Orthopedist, one who cures deformities of the limbs.

Oscillating Engine, a marine engine, with a vibrating cylinder. See STEAM-ENGINE.

Osier, a willow with bending flexible shoots, used for basket-making. The common *O.*, *Salix viminalis* and *S. caprea*, are cultivated for hoops.

Osleon-Iron, bars of iron specially made for the manufacture of wire.

Osmazone, the savory portion or essence of meat, soluble in water.

Ostrich-Feathers. See FEATHER.

Ostende. See BELGIUM.

Oswego, a port of entry and city of New York State, on the *O.* River, at its entrance into Lake Ontario, about 170 m. W. N. W. of Albany; lat. 43° 28′ N., lon. 76° 35′ W. It has a good harbor, which is formed by the mouth of the river, and enclosed by costly jetties and breakwaters. The channel has a depth of 20 feet at low water, and the water in the harbor is from 9 to 12 feet. The U. States government began in 1871 the construction of an outer and deeper harbor, which, when completed, will afford a wharfage of 4 m. *O.* has a very extensive commerce, and does as much business as many cities of twice its population. Its trade in lumber and coal with Canada is considerable, and it has 11 grain elevators and storehouses, with an aggregate capacity of 2,165,000 bushels, at which are handled much of the Western grain crop and almost the entire barley crop of Canada. The *O.* River has a fall of 34 feet within the limits of the city, affording an immense hydraulic power for manufacturing purposes, which branch of industry is rapidly increasing, and, with the commerce of the port, constitutes *O.* one of the most important cities of our N. frontier. *O.* has 20 large flouring-mills, several iron-foundries, machine-shops, ship-yards, and a manufactory of starch, which is said to be the most important of its kind in the world. For the year 1879 the imports (chiefly barley and lumber) amounted to $5,173,380; and the exports to $944,963. During the same year 1,775 vessels of 289,631 tons entered, and 1,770 vessels of 288,636 tons cleared, the port in the foreign trade; 527 vessels of 92,481 tons entered, and 526, of 96,365 tons, cleared, in the coastwise trade. There were 129 vessels of 22,604 tons in aggregate belonging to the port. *O.* is the N. terminus of the *O.* canal, which connects at Syracuse with the Erie canal, and is connected with New York City by the New York and Oswego Midland R.R. The other railroads which converge at this place are the Lake Ontario Shore, the Oswego and Syracuse, and the Rome, Watertown, and Ogdensburg. *O.* has 4 national banks, with an aggregate capital of $695,000; 2 state banks, $400,000; and 2 savings-banks. Pop. 30,000.

Oswego and Syracuse R.R. runs from Oswego to Syracuse, 34.98 m. This Co. was chartered in 1839, and the road was opened in 1848. The line was leased in 1868 to the Delaware, Lackawanna, and Western R.R. Co., the lessees paying interest on the bonds, and 9 per cent dividends on the stock. Capital stock, $1,340,400; funded debt, $461,500. Cost of construction and equipment, $1,762,540. Address of the Co., 22 Exchange Place, New York City.

Otter, a name for two distinct animals, the land-otter, *Lutra vulgaris* and *L. Canadensis*, and the sea-otter, *Enhydra marina*. Both are caught for their fur. See FUR.

Otto, or ATTAR, OF ROSES, a well-known perfume of great strength, is an essential oil prepared in several parts of Asia and in Egypt from the *Rosa moschata* and *Rosa Damascena*. It is said that 100,000 roses yield but 180 grains of attar. This oil is at first of a palish green color, which by keeping becomes darker, and presents various tints of green, yellow, and red. Its price in the trade is about $40 per oz., but, when guaranteed genuine, it sells for $50 to $100 in the London warehouses. *Imp.* free.

Ottoman, a couch or sofa; a stuffed stool or hassock; a reclining or easy seat.

Ouch, the socket or setting of a precious stone.

Ounce, a weight, a common division of the English pound, derived from the Latin *uncia*, a twelfth part. The troy pound is twelve ounces, but the avoirdupois or commercial pound contains sixteen ounces, and is so divided in most of the countries of northern Europe. The English troy ounce weighs 480 grains, but the troy ounce varies considerably in other countries.

Outcrop, an exposure of strata, or a bed or vein of mineral at the earth's surface.

Outfit, the equipment for a voyage or journey; the habiliments of a workman, soldier, etc.

Outil [Fr.], a tool.

Outillage [Fr.], a stock of tools.

Outlet, a passage of any kind.

Out of Print, publications that are sold off; not to be obtained.

Outport, a harbor some distance from the chief town or seat of trade; a port away from the main custom-house.

Out-Put, a term in the iron-trade for the make of metal or annual quantity made.

Outrigger, a strong beam of timber, of which there are several, fixed upon the side of a ship, and projecting from it, in order to secure the masts in the act of careening, by counteracting the strain they suffer from the effort of the careening tackles, which, being applied to the mast-head, draw it downward, so as to act upon the vessel with the power of a lever, whose fulcrum is in her centre of gravity. Outrigger is also a small boom, occasionally used in the top to give additional security to the top-mast.

Outsides, the exterior sheets of a ream of printing or writing paper; spoiled sheets.

Outstanding, book-debts, liabilities, accounts, etc., not closed or settled.

Outward-Bound, merchant-ships departing for a distant voyage.

Ouvrier [Fr.], a workman; an artificer.

Oven, a place arched over with brick-work or masonry for baking, heating, or drying anything. — An apparatus for roasting, baking, or drying. The relation which an *O.* bears to a stove, a furnace, or a kiln is not always very definite, the four terms being used rather indiscriminately.

Oven-Fork, Oven-Rake, a tool or stirrer for ashes in a stove or oven.

Over, surplus; cash on hand not accounted for; a term for money on hand not required for the day's payments; as, have you anything *over* to-day? meaning, have you more money than you have use for to-day? This last use of the term is common with money-borrowers; it is also much in use with bankers and brokers. *T. McElrath.* — A term used to designate the quantity a vessel may deliver beyond that specified in the bill of lading.

Overalls, a kind of leggins worn to keep the wet from the legs.

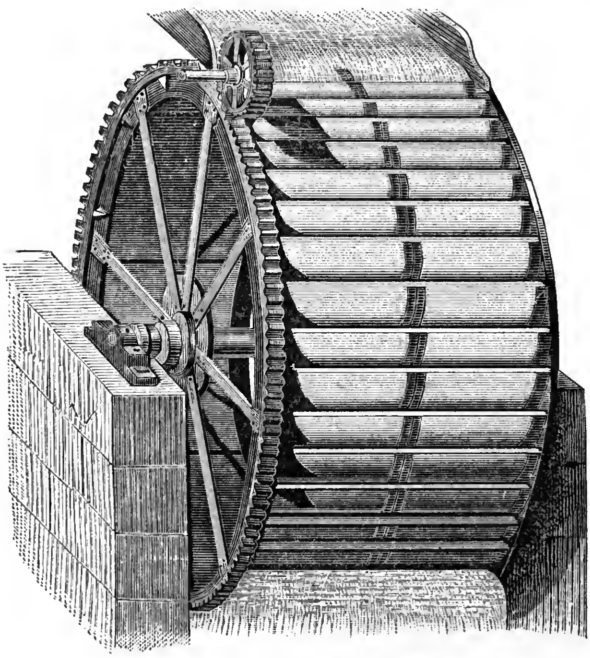

Fig. 382. — Overshot Water-Wheel.

Overboard, thrown or fallen into the sea.

Overcharge, an exorbitant or unreasonable price for work or labor done.

Overdraw, to draw on a banker or merchant for a larger sum than stands to the credit of the drawer.

Overdue, beyond the date or assigned limit, as an unpaid account or bill of exchange. — A vessel, train, etc., past time.

Overhaul, to search, to examine. — To gain on another vessel in sailing at sea.

Overlapping, lying one over another, as the slates or tiles on a roof.

Over-Leather, the upper leather of shoes and boots.

Overload, to put too much goods or lading on an animal or in a vessel.

Overlooker, an inspector of workmen, a superintendent.

Overman, Back-Overman, an overlooker appointed to each shift of workmen in a coal-pit.

Overmasted, top-heavy; a vessel is said to be overmasted when her masts are too lofty, or too bulky, for her size, or for her hold of the water.

Overplus, surplusage; something left; more than is requisite.

Overseer, an inspector; the resident manager of a sugar estate in the West Indies.

Overshoes, galoches; india-rubber shoes for wet weather, worn over others.

Overshot Wheel, the wheel of a water-mill driven by the weight of water falling in the upper buckets, while those on part of the lower circumference are empty (Fig. 382). It acts chiefly by gravity, but its power is, of course, increased by the velocity with which the water arrives.

Overtime, Overwork, extra labor done beyond the regular fixed hours of business.

Overtrading, speculating or purchase beyond one's capital or available means.

Overweight, beyond the prescribed or legal weight.

Ovine, pertaining to sheep.

Ovolo, a moulding merely exposing the quarter of a circle; it is generally sunk upon the solid angle of a piece of work.

Owner; a possessor; a proprietor.

Ox, a male animal of the bovine tribe. The services which oxen, and, indeed, cattle generally, render to the arts are so many that they can hardly be named. The hides, the hair, the horns, the teeth, the bones, the blood, the tallow, the marrow, the intestines, the gall, the hoofs, the tendons, — all are eagerly bought up, and some of them are made the bases of large branches of manufacture, after the butcher has been supplied with that which is the primary object of the grazier's attention, viz. the meat or flesh. See Cattle (neat), Hair, Horn, Leather, Tallow, etc.

Oxalic Acid, a vegetable acid found in considerable quantity in sorrel and rhubarb. It is most readily procured by the action of nitric acid on sugar, and hence has been termed acid of sugar. It occurs crystallized, in four-sided prisms, transparent, and so intensely sour that if 1 grain be dissolved in 3,600 grains of water, it will be perceptible to the taste; while in 200,000 times its weight of water it may be detected by means of a simple chemical test. This acid is highly poisonous, and accidents have frequently occurred from its being administered instead of Epsom salts, which it resembles in appearance. It is used in calico-printing and by straw-hat makers; also for cleaning boot-tops, and for removing iron-stains and ink-spots from cloth. United with bases, it forms salts, called oxalates, which are applied to various purposes. It is an object of considerable manufacture, especially in Switzerland, where it is prepared from the juice of wood sorrel. *Imp.* free.

Ox-Bow. See Ox-Yoke.

Ox-Gall, the bile or bitter fluid secreted by the liver of the ox, which is used for scouring cloth, cleaning carpets, and, when refined, by artists.

Oxide. As *oxygen* is the most abundant of all natural elements, and the one which enters into the greatest number of combinations with others,

it follows almost of necessity that *oxides* (combinations of oxygen with one other element) are the most numerous of binary compounds. To name their multifarious uses in the arts would be to go through nearly the whole range of man's industry. Under the names of the principal metals, alkalies, earths, etc., the oxides are briefly noticed. When another simple substance takes up oxygen, it is generally (but not always) said to be *oxidized.*

Oxidizing, Oxidation. The oxidizing of metals is brought about by a number of natural agencies, combining the metals chemically with a certain definite quantity of oxygen, and the same thing is done artificially in a wide range of the manufacturing arts. Not only the metals, but sulphur, phosphorus, carbon, etc., may be oxidized by various natural and artificial means. A mode of oxidating bodies dissolved in water by the action of air alone has been recently devised. This is an example of *oxidation,* as distinguished from *oxidizing.* The liquid to be oxidated is put into a vessel with a double bottom, the upper surface of which is perforated with small holes. A pipe ascends from the false bottom to a little above the top of the vessel; over the open upper end of this pipe is a jet connected with a steam-boiler. Steam, at a pressure of 40 lbs. per square inch, rushes from the jet down the pipe, carrying with it a very large quantity of air; this air, accumulating in the false bottom, rushes up through the perforations, and mixes with the solution, rapidly oxidating substances which may be in the water. The heat communicated to the solution by the steam greatly facilitates the process. It is considered that this method may be useful in making soda-water and other aerated waters, and in many chemical manufactures.

Oxidized Oil, a solid, elastic substance produced by oxidizing linseed oil, used in the manufacture of artificial leather, and as a substitute for vulcanized india-rubber.

Oxidized Silver, more properly sulphuretted silver; a process of turning the surface dull and dark by washing it with a solution of sulphuret of sodium or potassium. It is much used by the French in the manufacture of bijouterie.

Oxygenator, a contrivance for throwing a current of air on the flame of an argand lamp.

Oxyhydrogen Blowpipe, an instrument much employed by chemists, mineralogists, and others, for the reduction of metallic ores, etc., from which, by the combustion of a mixture of oxygen and hydrogen gases, a very intense heat is obtained, and substances the most intractable have been fused.

Oxyhydrogen Light. See Drummond Light.

Oxyhydrogen Microscope, a very powerful microscope for reflecting objects by an intense light.

Oxymel, a mixture of honey and vinegar, which is prescribed as an expectorant and demulcent. It is frequently combined with other medical ingredients, and then named from them, as oxymel of squills, etc.

Ox-Yoke, Ox-Bow, a piece of curved wood put round the neck of a draught ox, as a kind of collar to attach the traces to.

Oyster. See this word in the Appendix.

Oyster-Plant. See Salsify.

P

Pace, a degree of speed, and in measurement the length of a stride. The military pace is $2\frac{1}{2}$ ft., the geometrical pace 5 ft.

Pachometer, an instrument for measuring the thickness of the glass of mirrors.

Pacific, a fire-insurance Co., located in New York City, and organized in 1851. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, \$200,000; net surplus, \$399,052. Risks in force, \$7,236,083; premiums, \$51,789. Premiums received since the organization of the Co., \$2,305,519; losses paid, \$1,132,071; cash dividends paid to bondholders, \$654,000.

Pacific Ocean, a vast expanse of water, extending between Asia and America, and covering a large portion of the surface of the globe. Its extreme S. limit is the Antarctic Circle, from which it stretches N. through 132° of latitude to Behring's Strait, which separates it from the Arctic Ocean. Its greatest breadth, from E. to W., measured along the equator, is about 10,000 m. In some parts it is very deep, but its bottom has not been so systematically surveyed as that of the Atlantic. The maximum depth known is 3,000 fathoms. Its shape is very irregular, but it becomes gradually narrower as it extends N., till at length the sea of Kamtschatka has a breadth of only 170 m. The American coast is pretty uniform, though high and bold, presenting the long range of the Andes close down to the shore. Its chief indentations are the Gulfs of California and Panama; besides which, at the N. and S. extremities, it is broken and rugged, forming numerous islands and fiords, similar to those of other high latitudes. The Asiatic coast-line, on the contrary, is extremely irregular, formed into deep bays, and subdivided by groups of islands into separate gulfs or seas, as the Sea of Okhotsk and the Yellow Sea; besides which, numerous straits are formed between the islands of the Asiatic Archipelago. The equator divides this vast expanse of water into the two grand portions of the *North* and *South Pacific Oceans*, both being remarkable for the numerous groups of small coralline and volcanic islands with which they are studded, and which constitute a distinct portion of the world called Polynesia. The general motion of the Pacific Ocean is from W. to E., or from the coast of America to that of Asia; and this motion is very powerful in the vast and uninterrupted extent of its waters. The N. E. trade-wind prevails uninterruptedly between lat. 5° and 23° N., and, with the currents, enable ships to sail from America to Asia with great rapidity, and almost without changing the sails. The S. E. trade-wind, which is not met with near the American coast, varies in its extent at different seasons; but it commonly prevails between the equator and 26° S., so that the region of calms in the *P. O.* extends over only 5° of latitude, or somewhat less than in the Atlantic. In lat. 40°, on both sides of the equator, tempests and variable winds prevail; but it may be remarked, generally, that N. of lat. 40° N., winds from W. and N. W. are more prevalent than any others, whereas in the regions S. of the trade-winds the prevailing winds are from S. W., and often extremely violent. Winds from the S., however, are found along the coast of Peru, and may be attributed, in some measure at least, to the strength of the polar current in the S. hemisphere. They are generally light, though steady. Navigators traversing the ocean between North America and Asia sail W. from Mexico, touching at the Sandwich Islands, and entering the Chinese Sea between the islands of Luzon and Formosa. The voyage from Asia to America is effected by seeking the region of the variable winds N. of lat. 30°, and making the coast of California.

Pack, the load for an animal. — A large hand-packed bale of goods, lashed with cord, of variable size: a pack of flour or Indian-corn meal, flax, etc., weighs 280 lbs.; of wool, 240 lbs. net. — A parcel of hounds kept for hunting or coursing. — A set of suits of playing-cards, 52 in number.

Package, PACKET, a small parcel.

Packcloth, a coarse baling material; the wrapper for a pack of goods.

Packer, a person who makes a business of receiving goods from merchants, to pack for forwarding inland or for shipment abroad.

Packet, a small bundle of letters or loose papers tied together.

Packet-Day, the mail-day; the day for posting letters, or for the departure of a ship.

Packet-Ship, a regular trader; a steam-vessel that carries mails and passengers at stated periods.

Pack-Horse, a horse which carries bales or packs.

Packing, a quantity of wood or coals piled up to support roofs in a mine or for other purposes. — The stuffing round a cylinder, etc.

Packing-Case, a deal or other box for moving and protecting goods.

Packing-Store, a place where goods are sent to be packed.

Pack-Thread, strong twine; small cordage that has been thrice twisted.

Pad, a cushion or stuffing, to compress, support, or protect a part. — A package or piece of blotting-paper, making a soft writing surface, and called *writing-pad*. — To travel on foot. — In dyeing, to impregnate cloth equally with a mordant.

Paddings, a cloth worked out of old rags for stuffing collars and other parts of coats.

Paddle, a broad but short oar, used in impelling light boats. — The blade or broad part of an oar or weapon. — One of the broad boards at the circumference of a water-wheel, or the float of the paddle-wheel of a steam-vessel. — A small sluice-gate. — An iron bar or blade for stirring ore in a furnace. — To propel by an ore or paddle.

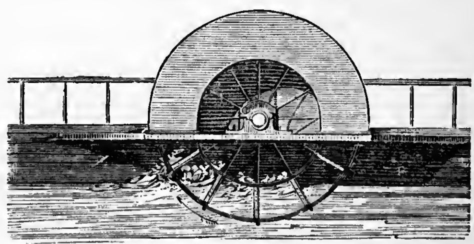

Fig. 383. — PADDLE-WHEEL.

Paddle-Box, the upper case or cover of the paddle-wheels in a steam-vessel, sometimes removable, and forming a kind of available life-boat.

Paddle-Wheel. The paddle used to propel a canoe may be regarded as the beginning of a paddle-wheel, seeing that such a wheel (Fig. 383) consists of many paddles, which, by rotation of the

wheel, dip successively into the water. There were mechanical boats before there were any steamboats, propelled by paddle-wheels, which were rotated by a winch handle. In its modern form the paddle-wheel has many radii or spokes, the outer ends of which support an equal number of *floats, boards,* or *paddles;* and it is the forcible passage of these boards through the water which causes the vessel, by reaction, to advance in the opposite direction. A good deal of power is wasted by the particular position of each paddle when it enters and leaves the water; and ship-builders now often endeavor to lessen this loss by a contrivance like that of *feathering* an oar. An oarsman gives a twist to his oar of such kind that the plane of the blade is nearly vertical at the instant of entering and quitting the water. A similar effect is produced in the movement of the paddle-wheel by the aid of an eccentric arrangement of rods and hinges. Large paddle-wheels are now made wholly of wrought-iron.

Paddle-Wood, a light, elastic, and very strong wood obtained from *Aspidosperma excelsa* in Guiana, which is preferred to any other for cotton-gin rollers. The fluted projections of the trunk are used by the Indians for the construction of their paddles.

Paddy, the name given in India to rice before the husk has been removed.

Padesoy. See PADUASOY.

Padlock, a lock with a link to hold on to a staple.

Padra, a kind of black tea.

Paducah and Elizabethtown R.R. runs from Elizabethtown to Paducah, Ky., 185.60 m. This Co., located at Elizabethtown, was organized in 1877 by the purchasing of the line, which was sold in 1876 on foreclosure of the Co. of the same name, by which the road was constructed and opened in 1872. Capital stock, $2,853,000 (half common and half preferred); funded debt, $1,428,194. Cost of construction and equipment, $4,277,633.

Page, one side of the leaf of a book or writing.

Paging-Machine, a machine for consecutive paging or impressing numerals on the sheets of blank account and other manuscript books. When used for numbering railroad and other tickets, it is called *numbering-machine.*

Pagoda, a gold coin formerly current in India, worth about $2. The pagoda is used as a weight in Madras, ten making a pollam.

Pail, a bucket; a wooden or tin vessel, carried by a moving handle, for holding water, milk, etc.

Paille [Fr.], straw or chaff.

Pain [Fr.], bread; a loaf.

Paint, a popular name for all coloring substances used as pigments. The paints used by oil-painters, water-color painters, enamel-painters, porcelain-painters, house-painters, etc., comprise an immense range of substances from the animal, vegetable, and mineral kingdom, — chiefly mineral; and these are mixed to the proper consistency with various liquids, such as varnish, oil, turpentine, size, vinegar, gum, water, etc. All the pigments, and the vehicles for mixing with them, are treated under their proper headings. — For the year 1879 our imports of paints amounted to $683,920, and our exports to $225,499.

Imp. duty: all paints or pigments n. o. p. f., 25 per cent.

Paint-Box, a child's box containing cakes of water-colors.

Painter, a workman who lays on oil-colors, and who often combines the trade of a glazier. Painters are subdivided into numerous classes, following separate branches, and include, among others, coach and chaise painters; house, sign, and fancy painters; herald painters; marine and ship painters; miniature and portrait painters; ornamental and standard painters; glass-painters, etc. — Painter is also the name for a rope attached to the bow of a boat to make her fast to a ship or pier with.

Painter's-Brush, a hair brush for oil-painting.

Painter's-Tools, brushes, pallets, paints, pots, and other utensils and implements used in painting.

Paintings, pictures worked in oil; those in water-colors are usually styled drawings, but no such distinction is made in commerce.

Imp. duty: all paintings n. o. p. f, 10 per cent; enamelled, on gold or other metal for jewellers, 20 per cent; paintings and other objects of art, the produce of American artists, provided the fact of such production be verified by the certificate of any consul or minister of the U. States, indorsed upon the written declaration of the artist, free.

Pair, a couple or brace; two articles that are fellows, as a pair of stockings, gloves, etc. A pair of stairs is one flight of stairs.

Palanquin, PALANKEEN, a portable couch used in the East Indies; a litter or covered carriage borne on men's shoulders.

Pale, in colors, wanting in intensity.

Pale Ale. See BEER.

Palempores, a species of Indian dimity, of elegant patterns, used for bed coverlets. They are sometimes flowered with gold, made of silk, and worked in shawl and other patterns of colored woven cotton.

Palermo. See SICILY.

Paletot, a loose thin overcoat.

Palissander, a name in France for rosewood or jacaranda. There is considerable irregularity in the employment of this name, which is sometimes applied to striped ebony, and in other cases to violet-wood.

Pall, a covering thrown over a coffin. — A cloak. — A detent or click to catch a ratchet-wheel.

Palladium, a rare metal which occurs in rolled grains with platina, and particles imbedded in and combined with gold. It does not tarnish, and has therefore been used by dentists, and by mathematical-instrument makers, particularly for balances.

Pallet, a painter's board, or porcelain slab, with a thumb-hole, on which the colors are mixed and held for use (also written *palette*). — In horology, the name given to the pieces connected with the pendulum or balance which receive the immediate impulse of the swing-wheel or balance-wheel. They are of various forms and constructions according to the kind of escapement employed. — A tool used by gilders to detach gold-leaf from the pillow, and apply or extend it.

Pallet-Knife, a painter's knife for scraping up paint.

Palm, a measure of $9\frac{59}{100}$ inches, being that measure by which Carrara marble is invoiced and sold, one cubic palm being reckoned as two cubic feet; in ship-building in England and the U. States, 3 inches; in Altona and Hamburg, $3\frac{3}{4}$ inches. See PALMS.

Palma. See CANARY ISLANDS.

Palma Christi. See CASTOR OIL.

Palmetto, a common name for several small palms. One species, the dwarf fan-palm, *Chamærops humilis*, common in the countries bordering on the Mediterranean, is now largely used in Algeria for many economic purposes. It furnishes a fibre resembling horse-hair, which is largely employed in France in making common carpets, and has been

prepared into a kind of flax-cotton. Paper and pasteboard are made of it, and it is spun into sailcloth. The leaves are also used for making brooms, seats of chairs, hats, thatch for cottages, etc. The leaves of another class of short palms, the *Thrinax*, have many economic uses. *T. argentea* furnishes the chip which is largely woven into hats and bonnets in the State of Massachusetts: "The raw leaves are mostly shipped from Cuba, in bunches of 25 each, and as delivered are from 4 to 5 feet long. They are taken to the bleaching-house, and after a process of brimstone bleaching the leaves are split into strips or a kind of straw. Nearly one third of all that passes through the hands of the splitters is spoiled, and only fit for the paper-makers, who usually buy it at about the rate of $50 per ton. After the straw is ready to be worked into hats, all the work is done by hand. In all the New England States, except Rhode Island, are agents who send the leaf out into the country among the wives and daughters of the farmers,

Fig. 384. — Oil Palm.

by whom it is braided into hats, and woven into webs for shaker hoods. Large teams are constantly passing over the hills, carrying material to be braided, or the work that has been finished. The number of people who find employment in this business is very great. It is light work, and a nimble-fingered girl of ten or twelve can earn as much in a day as an adult woman. Boston is the chief centre of the palm-leaf hat trade; the great bulk of the manufacture, which amounts to over 300,000 dozen annually, goes to the W. States." — *T. McElrath.* The dwarf palmetto, *Sabal Andersonii*, found from North Carolina to Florida, is chiefly used for fans, for which the leaves are perfectly adapted.

Palm-Oil is obtained from the fruit of several species of palms, but especially from that of the *Elais guineensis* (Fig. 384), growing on the W. coast of Africa, to the S. of Fernando Po, and in Brazil. When imported, the oil is about the consistence of butter, of a yellowish color, and scarcely any particular taste; by long keeping it becomes rancid, loses its color, which fades to a dirty white, and in this state is to be rejected. It is sometimes imitated with hog's lard, colored with turmeric, and scented with Florentine iris-root. The inhabitants of the coast of Guinea employ palm-oil for the same purposes that we do butter. Our supplies of palm-oil are almost wholly derived from the W. coast of Africa, of which it is the staple article of export. It is used in the manufacture of soap and candles. *Imp.* free.

Palms, called by Linnæus, from their noble and stately appearance, the princes of the vegetable kingdom, are an order of arborescent endogens, chiefly inhabiting the tropics, distinguished by their fleshy, colorless, six-parted flowers, enclosed within spathes; their minute embryo, lying in the midst of albumen, and remote from the hilum; and rigid, plaited or pinnated inarticulated leaves, sometimes called fronds. Wine, oil, flax, flour, sugar, salt, thread, utensils, weapons, food, etc., are the produce of this tribe. The most common species is the cocoa-nut. Their wounded stems, or spathes, yield in abundance a saccharine fluid, known in India by the name of toddy. The succulent rind of the date is a most nutritious as well as agreeable fruit. Sago is yielded by the interior of the trunks of nearly all, except *Areca catechu*, the well-known *pisang*, or betel-nut. The fruit of the latter species is remarkable for its narcotic or intoxicating power. The common canes or rattans of the shops are the flexible stems of species of the genus *Calamus*. The stems or trunks of palms furnish a great variety of wood, black, brown, prickly brown, and speckled, and are used for cabinet and marquetry work and for billiard cues. See Palmetto.

Pamphlet, a small unbound book; stitched printed sheets, generally printed in 8vo.

Pan, a broad and shallow earthen or metal vessel. — The hollow part of a gunlock that holds the priming powder. — See also Betel.

Panama. See Colombia (U. States of).

Panama (Isthmus of). See this heading in the Appendix.

Panama Hats, very fine plaited hats made from the fan-shaped leaves of *Carludovica palmata*, a dwarf palm-tree which grows in Peru, Ecuador, Colombia, and Venezuela, and is called *Jipijapa* in Central America. The best are made at Moyobamba, a town of N. Peru, and at Monari in Ecuador; they fetch a high price. The hats sold in New York, generally the poorest of all Panama Hats, come for the most part from the U. States of Colombia.

Pane, a separate sheet or panel of glass in a window; a piece of variegated work.

Panel, a square; the space or compartment within a margin, as the sunken compartments of wainscoting, ceilings, etc.; a square of paper; the surface of a hewn stone; etc. — In mining, a heap of ore dressed and ready for sale.

Panic, a monetary crisis; a sudden alarm.

Panneau [Fr.], a panel of thin wood.

Pannier, a hamper or basket.

Panonia Leather, an American leather cloth, a textile fabric impregnated with oak-bark and gelatine, and to which a flexible varnish containing lamp-black is afterwards added. — *T. McElrath.*

Panorama, a general view; a large cylindrical painting seen from the inside, or rolled along so as to be seen from the outside.

Pantaloon, a species of close, long trousers,

worn by males, extending from the waist to the heels; — used in the plural, and abbreviated *pants.*

Pantograph, an instrument for enlarging or reducing the copy of a drawing, map, or any other design. A *tracer* is passed over every line of the original; a *pencil* at the same time marks every line on the copy; and according to the mode in which certain levers are hinged together, the copy may be made larger or smaller than the original, or exactly equal to it.

Pantometer, an instrument for measuring angles for the determination of elevations, distances, etc.

Pantomime, a humorous or grotesque representation; buffoonery in dumb-show.

Pantry, a closet in a house where provisions are kept, or plate and knives are cleaned.

Papaw, the *Carica papaya*, a tree of the West Indies, also found in the most southern part of Florida. The fruit is a large berry, about 10 in. long and half as broad, externally ribbed, of a dull orange-color, and having a thick fleshy rind. It is eaten raw with pepper and sugar, and is also cooked with sugar and lemon-juice; the unripe fruit is boiled and eaten as a vegetable, and is also pickled. Another tree, the *Asimina triloba*, is also called papaw, and is common in many parts of the Southwestern States. Its fruit, which ripens in September, is about 4 in. long, 1 in. thick, and uneven as if slightly swollen in places. Its rather tender skin is yellow when quite ripe; its flesh, when completely ripened, is of a soft, custard-like consistency, and very sweet.

Paper [Fr. and Ger. *papier;* It. *carta;* Sp. *papel*]. This highly useful substance is, as every one knows, thin, flexible, of different colors, but most commonly white, being used for writing and printing upon and for various other purposes. The term *paper* is derived from the Greek word **παπῦρος**, *papyrus*, the name of the plant on the inner bark of which (*Liber*, **βιβλος**, whence our word *book*) the ancients used to write. Some of those learned and ingenious persons who have investigated the arts of the ancient world have expressed their surprise that the Greeks and Romans, though they possessed an immense number of books, and approached very near to printing in the stamping of words and letters, and similar devices, should not have discovered the art; the first rude attempts at typography being sufficiently obvious, though much time and contrivance have been required to bring the process to its present state of perfection. But they should rather, perhaps, have wondered that the more civilized nations of antiquity did not invent paper, an invention which, it may easily be shown, necessarily preceded that of printing. But this was an exceedingly difficult task; the more so, that the vast importance of paper could not be appreciated, or even imagined, till after it had been generally introduced. At first, the memory of important events appears to have been handed down by inscriptions cut on rocks, pillars of stone or marble, and the walls of edifices; and this primitive usage is still retained in the monuments in our churches and cemeteries. In a later, though still very remote age, men were accustomed to write upon portable surfaces of various kinds. Everybody knows that the Decalogue was written upon tables of stone; and Joshua wrote a copy of the law upon the like material. The Greeks and Romans engraved laws, treaties, contracts, and other important documents, on plates of brass; and it is stated that a fire which broke out in the capitol, in the reign of Vespasian, consumed above 3,000 such bronze muniments. But exclusive of plates of this sort, which were necessarily inconvenient, costly, and quite unfit for ordinary use, thin and flexible plates of lead and other metals (*Job* xix. 23, 24), thin pieces of wood, skins, parchment, linen, and a variety of similar substances, were used in writing. Cheaper materials, such as the leaves and bark of trees, palms, etc., were also used from a very remote period for the same purpose; but leaves being, when dry, apt to split in the direction of the fibres, it was found to be necessary, in preparing them for writing, to glue them together, so that the fibres might cross each other in opposite directions. The texture of the leaf, or sheet, if we may so call it, is thus greatly strengthened; and when it has been smoothed, polished, and fitted for use,

Fig. 385. — Papyrus.

it is less inconvenient and better looking than might be supposed. Such, in fact, is the principle on which the paper of the ancients was formed. This, however, which was called *Charta Egyptiaca*, from the place of its manufacture, did not consist of leaves, but of the inner bark of the famous reed or rush, the *Cyperus papyrus*, found along the banks of the Nile, or rather in the pools and ditches which communicate with the river. The ancients applied this useful plant to an immense variety of purposes; but here we shall only notice that from which it has acquired an immortality of renown. The inner bark having been divided by a needle or other sharp instrument into very thin and broad layers or filaments, portions of these were placed side by side longitudinally, and glued together at the ends; another portion being glued crosswise on the backs of the latter, to give the page the requisite strength. Egypt enjoyed for a lengthened period a natural monopoly of this valuable article, and even attempted, in anticipation of a later policy, by pro-

hibiting the growth of the papyrus, except in certain localities, and limiting its supply, to sell its produce at an artificially enhanced price! But this policy ceased on the conquest of Egypt by the Romans, who, having imported the plant into Rome, succeeded in preparing from it a very superior article. Pliny enumerates the various kinds of paper, from the coarsest, which was used, like our brown paper, for packing, to the most expensive and finest. The latter, which was made of the innermost filaments, was of a snowy whiteness; and when properly dressed and polished, was easily written upon. The consumption was very considerable; and being, after the foundation of Alexandria, principally made in that city, it formed an important article in her commerce, and furnished employment for many workmen and much capital. — Though white, smooth, durable, and not ill adapted for writing, ancient paper was not suited for the printer; by reason of the closeness of the grain, it would not have received the ink from types more kindly than shavings of wood, and such like materials, and its texture was so very brittle that it would have shivered to pieces under the press. It was, in truth, an inartificial mass, no great invention or ingenuity being shown in its preparation. Modern paper, on the other hand, is wholly artificial; and the contrivances for its manufacture are marvellous alike for the sagacity evinced in their design and their practical efficiency. Like the paper of antiquity, it is formed of the filaments of various sorts of vegetable substances, derived principally from the tearing to pieces or pounding cotton and linen rags, and similar materials, mixed with water. This process is called beating them into pulp; and when examined with a microscope, the floating filaments are found to be well fitted for adhering together, being jagged and rough, and mixed in every possible way. A portion of this mixture or pulp being, when properly prepared, poured upon moulds or sieves of fine woven wire, the water is drained off, and the suspended fibres falling to the bottom form a layer or sheet, which, being consolidated by pressure and dried, becomes paper, its strength and goodness depending of course, in a great measure, on the quality of the rag or other material of which it is made. Paper used to be manufactured by dipping sieves or frames into the pulp, the portion of filaments so lifted up forming the sheet of paper. But the application of rotary motion to the manufacture has effected a total change in the mode in which it was carried on: instead of dipping the sieves or frames into the cistern or pulp, a circular web or round towel of woven wire revolves horizontally under the vessel (technically called the vat), receives the deposit, conveys it away, and, by an adjustment of extraordinary delicacy, transfers it uninjured, though as fragile as a wet cobweb, to a similar revolving towel of felt; thus an endless web of paper is spun, as long, at least, as the machine continues to move and pulp is supplied. The pervious and spongy texture of paper makes it readily imbibe and retain the ink impressed on it by types in printing, and by the pen in writing; its toughness hinders it from being easily torn; and, in a well-bound book, under favorable circumstances, its duration is indefinite, and, for all practical purposes, eternal! It is true that legal documents are sometimes written or printed on parchment, which is less liable to be torn or injured by rubbing; the luxury of typography occasionally, also, exhibits a few impressions of a splendid work upon vellum, and it is further true that these substances were used for writing upon by the ancients; but they are necessarily expensive, and the cost of either far exceeds the means of the great majority of book-buyers, — so that it would be altogether unprofitable to cast types, to construct presses, and to incur the various and heavy charges of an establishment for printing, unless we possessed a cheaper material on which to print. Almost all the more ancient and valuable existing Greek and Latin manuscripts are written either on parchment or vellum, but generally on the latter. It is singular, however, that while such is the case, all or almost all the very old charters and diplomas are written on papyrus. — It appears to be sufficiently established that paper, fabricated like that now in use, of cotton and other vegetable materials, and of silk, has been manufactured in China from a very remote epoch. The Arab historians state that similar paper was manufactured in Mecca in the beginning of the 8th century, and most probably the mode of its production was then also known to the Greeks. It appears to have been soon after introduced into Europe, but it is doubtful whether this were done by the Arabians or Greeks. The mode of fabricating paper from cotton and other vegetable materials being once discovered, its fabrication from linen rags was a comparatively easy, and in Europe, where cotton was then extremely scarce, an all but necessary step. It is singular, however, that we have no information either as to the country where, or the epoch when, paper from rags began to be manufactured in Europe. It was introduced into France and Germany about 1314; and the first paper-mill in England was at Hertford, early in the 16th century. The first paper-mill erected in the U. States was in 1714, in Delaware, afterwards owned by a Mr. Wilcox, who furnished paper to Franklin. It was introduced into Massachusetts in 1717, and into Norwich, Conn., in 1768. It soon made rapid progress, so that in Pennsylvania, New Jersey, and Delaware there were 40 paper-mills in 1770, and into the New England States the supply was far short of the demand. In 1810 the number of paper-mills in the U. States was 185, producing over 200,000 reams of writing-paper, besides over 100,000 reams of wrapping and other kinds of paper. But great difficulty was experienced in the procuring of rags, and premiums were offered by several companies to any one who would make the greatest quantity of paper from other material than cotton and rags, which resulted in various experiments, with straw, the cane or reed of the Southern swamps, and other vegetable matter, some of which have been very successful. About 1810, rags began to be largely imported from Europe, and as the demand for paper was very great, the paper-mills increased in proportion, so that in 1856 the consumption of paper equalled that of England and France together, the total amount produced in the U. States being 200,000 tons per annum, while that of Great Britain was 66,000 tons, and France 70,000 tons. There were in the U. States in 1870 (not including paper-hangings) 669 manufacturing establishments for writing, printing, and wrapping paper, employing a capital of $34,365,014, their products being valued at $48,676,935. Of these, 174 were in New York, producing $10,301,563; 65 in Massachusetts, $6,661,886; 75 in Pennsylvania, $5,176,646; 43 in Ohio, $3,799,505; and 60 in Connecticut, $2,715,630. Owing to a protective tariff, foreign papers cannot reach our markets, and the imports, for the year 1879, were reduced to some fancy papers, valued at $20,631. Our exports for the same year (chiefly

to the West Indies and South America), including stationery, were valued at $1,117,677. — The materials for paper patented in Europe and America, and in most instances tried for a limited time, have been exceedingly numerous. They comprise literally hundreds of kinds of leaf, thistle, stalk, moss, shoot, husk, heath, tendril, cane, bark, root, pith, reed, rush, grass, lichen, weed, nettle, and other plants, or portions of plants; together with spent tan, wood shavings, asbestos, fern, hair, peat, wool, leather, and other substances not easily brought under any particular classification. In every case the substance is brought to a pulp by various degrees of steeping and boiling; the pulp is reduced to the state of a thin film by the draining action of a square sieve or wire screen; and the film thus produced is dried into a sheet of paper. It is found that nothing equals rags, especially those of *linen*, as a material for paper. *Straw*, however, being cheaper than linen rags, attempts are constantly being made to extend its use in paper-making; and, indeed, much straw paper is now made for writing, printing, and wrapping purposes; but the actual cost of working is nearly as great, owing to the necessary use of chemicals to act upon the straw pulp. Esparto, a Spanish grass, is much used for common printing-paper. There is a large use of hemp and old rope for coarse brown paper. A good deal of mineral substance is now mixed with the fibre, such as white clay, gypsum, and calcined flint. A small portion improves the paper by filling up pores; but a large percentage is clearly a mere matter of cheapness. The imports of cotton or linen rags into the U. States, for the year 1879, amounted to 89,962,702 lbs., valued at $2,402,457.

Manuf. — We will suppose the best machinery to be employed, and linen rags to be the chief material. The processes occur in the following routine: — *Rag cutting.* The cutting table has a surface of coarse wire netting, and bears a large upright knife in the middle. A woman takes the pieces of rag one by one, and scrapes them along the edge of the knife, by which they are easily severed. When cut into pieces of pretty uniform size, she drops them into three or four different cells, or compartments, according to the quality. — *Rag dusting.* All rags are dusty when brought to the mill. They are therefore put into the rag-dusting machine, where a revolving shaft with radiating spikes tosses them about, and the dust falls out, either at the lower end of the inclined cylinder, or through the wire-gauze of which the cylinder is made. — *Rag boiling.* Here the dirtiness of different rags is more distinctly shown than in dusting. They are boiled in alkaline water, in a vessel heated by steam, and so kept rotating that all parts may be equally acted upon. — *Pulping and washing.* One more cleansing process. The rags in the rag-engine are not only exposed to a continuous stream of water, but are at the same time subjected to the action of a series of knives fixed to a roller, by which they are converted into a pulp of small fragments called *half-stuff.* — *Bleaching.* The half-stuff is then bleached with chloride of lime in a vessel called the bleaching-vat; or sometimes the bleaching is done at the same time as the washing and pulping. — *Beating.* The bleached half-stuff is next transferred to the beating-engine, when, being subjected to the action of the toothed and edged rollers revolving 150 times a minute, it is reduced still finer, and takes the name of *pulp*, or *stuff.* — *Hand paper-making.* All paper used to be made by hand, and some kinds are still so made. The stuff is transferred to a vat, and kept warm. A *mould* and *deckel* are used to make it into paper. The mould is a shallow wooden frame, somewhat larger than the sheet of paper to be made; it has wires tightly stretched across it, very close together, and these wires produce the slight markings, or apparent edges and hollows, in foolscap and some other kinds of paper. The deckel is a slight frame, outside as large as the mould, inside as large as the paper. The mould, with the deckel placed on it, is dipped in the stuff, a quantity of which is taken up on it. The water drains through the wires, and the thicker part of the pulp, or stuff, remains as a thin film upon them. The deckel being removed, the film is turned out of the mould upon a *felt* or piece of woollen cloth; then another film, then another felt, and so on. To make large sheets by this method is difficult and somewhat laborious work. — *Machine paper-making.* At length we come to the beautiful paper-making machine, which, by the successive inventions of Fourdrinier, Dickenson, Bryan and Donkin, etc., has become one of the most perfect automatic machines known in the arts. It performs many distinct processes, each of which has its own particular part of the apparatus. The pulp falls into the *stuff-chest*, where it is diluted with water and kept constantly stirred. Falling into a trough below, it parts from all knots or impurities which are unable to pass through very small holes in a brass plate. The stuff flows upon an endless cloth or apron of wire-gauze, so fine as to have 3,000 to 5,000 meshes in a square inch. The apron has a vibrating motion given to it by rollers underneath; and this causes the stuff to distribute itself in an equable layer, and to shake off superfluous water. The stuff, travelling along as the apron travels, passes over a box or recess in which an air-pump produces a partial vacuum; and this vacuum sucks out nearly all the remaining moisture, leaving the stuff virtually in the state of a dry film. The film passes between rollers which compress and solidify it, and at the same time give it what is called the *water-mark.* Travelling along an endless felt, the film receives further pressure from other rollers. The paper (which the film has now become) dips into a vessel of size, which coats it on both sides. It passes over a steam-heated cylinder, which thoroughly dries the size. Either in the same machine, or in another which acts end to end with it, the paper, which at present is in the form of an endless sheet coiled round a cylinder, is cut up into sheets by a reciprocating knife, all the sheets being of one size, determined by the adjustment of the machine. Finally, the sheets fall down and arrange themselves in a regular pile upon a table. So beautifully are all these successive processes managed, that each comes into operation exactly at the proper instant. The substance never stops in its progress; it enters as liquid half-stuff at one end of the machine, and it quits the other end in a few minutes in the form of a pile of dry sheets of white paper. — *Finishing.* The sheets of paper, thus produced, are counted into *quires* of twenty-four each, and the quires into *reams* of twenty each. Either hot pressure or cold pressure gives a certain degree of smoothness and polish to them. The machines employed will make paper from 54 to 102 inches wide; the latter width accounts for the great size of some of the printed sheets which are now published. A 72-inch machine will make about 8 tons of paper per week, of medium quality and at a medium speed of working. The kinds of paper are various, — *printing, writing, wrapping, cartridge, tissue, blotting, filtering, lithographic, copying, tracing, tinted, toned*, etc. The technical names for the sizes of the sheets into which the paper is made are given in the following table, which is copied from *Knight's American Mechanical Dictionary*: —

Printing Papers.

	Sheet.	Folio.	4to.	8vo.	16mo.	32mo.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Demy..........	22½ × 17½	17½ × 11¼	11¼ × 8¾	8¾ × 5½	5½ × 4¾	4¾ × 2¾
Medium.........	24 × 19	19 × 12	12 × 9½	9½ × 6	6 × 4¾	4¾ × 3
Royal..........	25 × 20	20 × 12½	12½ × 10	10 × 6¼	6¼ × 5	5 × 3⅛
Super-royal....	27½ × 20½	20½ × 13¾	13¾ × 10¼	10¼ × 6¾	6¾ × 5⅛	5⅛ × 3¼
Imperial.......	30 × 22	22 × 15	15 × 11	11 × 7½	7½ × 5½	5½ × 3¾
Double foolscap	27 × 17	17 × 13½	13½ × 8½	8½ × 6¾	6¾ × 4¼	4¼ × 3⅜
Double crown..	30 × 20	20 × 15	15 × 10	10 × 7½	7½ × 5	5 × 3¾
Double post....	32 × 20	20 × 16	16 × 10	10 × 8	8 × 5	5 × 4

Drawing Papers.

Emperor.......	72 × 48	48 × 36	36 × 24	24 × 18	18 × 12	12 × 9
Antiquarian....	53 × 31	31 × 26½	26½ × 15½	15½ × 13¼	13¼ × 7¾	7¾ × 6½
Double elephant	40 × 26¾	26¾ × 20	20 × 13¼	13¼ × 10	10 × 6½	6½ × 5
Atlas..........	36 × 26	26 × 18	18 × 13	13 × 9	9 × 6½	6½ × 4½
Columbia......	34½ × 23½	23½ × 17¼	17¼ × 11¾	11¾ × 8½	8½ × 5¾	5¾ × 4¼
Imperial.......	30 × 22	22 × 15	15 × 11	11 × 7½	7½ × 5½	5½ × 3¾
Elephant......	28 × 23	23 × 14	14 × 11½	11½ × 7	7 × 5¾	5¾ × 3½

Writing Papers.

Super-royal....	27 × 19	19 × 13½	13½ × 9½	9½ × 6¾	6¾ × 4¾	
Royal..........	24 × 19	19 × 12	12 × 9½	9½ × 6	6 × 4¾	
Medium........	22 × 17½	17½ × 11	11 × 8¾	8¾ × 5½	5½ × 4¼	
Demy..........	20 × 15½	15½ × 10	10 × 7¾	7¾ × 5	5 × 3¾	
Large post......	20¾ × 16¾	16¾ × 10¼	10¼ × 8¼	8¼ × 5⅛	5⅛ × 4⅛	
Small post......	19 × 15¼	15¼ × 9½	9½ × 7½	7½ × 4¾	4¾ × 3¾	
Foolscap.......	17 × 13½	13½ × 8½	8½ × 6¾	6¾ × 4¼	4¼ × 3¼	

Paper Boxes. The manufacture of boxes from paper, or rather pasteboard, has become a very large one, from the custom of so many manufacturers selling their goods in these boxes. It is said that in Paris four thousand persons are employed in this trade alone. The trade is divided into six branches. The first comprises the most elaborately finished and ornamented boxes, for the display of artificial flowers, rich velvets, ribbons, silks, trimmings, medals, miniatures, and corbeilles for wedding presents. The second class consists of boxes and small ornaments for confectioners The third kind is used for packing toys and trinkets of small size The fourth kind is for perfumery, fans, gloves, etc. The fifth comprises large boxes for shawls and ribbons for exportation. The sixth are pill-boxes, wafer-boxes, and others of the smallest kind. The French productions in this department of manufactures are superior to any other in neatness of execution and taste of ornamentation.

Chinese Paper. The Chinese make a filamentous kind of paper much superior to ancient papyrus; it obtains in England the name of rice-paper; but sufficient is now known of it to show that this is by no means a correct designation. Dr. Livingstone introduced Chinese rice-paper in England about half a century ago; it had great favor as a material for artificial flowers. It was many years afterward that information was obtained concerning the mode adopted by the Chinese in making these small but very expensive sheets of paper. There is a leguminous plant growing in China and India, the stem of which is cut into pieces eight or ten inches in length; and these are cut by the Chinese into one continuous spiral film, on the same principle as the modern mode of veneer cutting, but by the dexterous use of hand-tools. These laminæ, being spread out and pressed flat, form thin sheets, which, after being dyed and otherwise prepared, constitute the rice-paper of the Chinese. The same ingenious people make paper of bamboo. The bamboo stems, when about three or four inches thick, are cut into pieces four or five inches long. These, when softened in water, are washed, cut into filaments, dried and bleached in the sun, boiled, beaten to a pulp, and made into thin sheets of paper. This is truly paper, which the former examples are not; and the art must have made a considerable advance before such a method could have suggested itself.

Paper-hangings. Since this important and elegant substitute for the ancient "hangings" of tapestry or cloth came into use about 200 years ago, the manufacture has undergone a gradual succession of improvements, and has now reached a high state of beauty and perfection.—The papers intended for paper-hangings are, in the first instance, covered with a uniform layer of the color which is to form the ground, and this is done even in the case of papers which are to have a white ground. The colors thus laid on, and those which are applied by the machine, are composed of finely ground coloring matters mixed with thin size or glue to a suitable consistence, and the ground-tint is given by bringing the upper surface of the paper, as it is mechanically unwound from a great roll, into contact with an endless band of cloth emerging from a trough containing a supply of the fluid color. The paper then passes over a horizontal table, where the layer of color is uniformly distributed over its surface by brushes moved by machinery, and the paper, after having been thoroughly dried, is ready to receive the impressions. The impressions may be given by flat blocks of wood on which the pattern is carved in relief, or from revolving cylinders on which the pattern is similarly carved. The former is the process of hand labor called "block printing," and it requires much skill and care on the part of the operator; but with these, excellent results are obtained, as a correct adjustment of the positions of the parts of the pattern can always be secured. The latter is the mode of printing mechanically on rollers, corresponding with the type-bearing cylinders of the machines already described: but for pattern printing on paper they are made of fine-grained wood, mounted on an iron axle, and they are carved so that the design to be printed stands out in relief on their surface. One of these rollers is represented in Fig 386, and it should be clearly understood that each color in the pattern on a wall-paper requires a separate roller, the design cut on which corresponds only with the forms the particular color contributes to the pattern. Such rollers being necessarily somewhat expensive, as the pattern is usually repeated many times over the cylindrical surface, the plan has been adopted of fastening a mass of hard composition in an iron axle, and when this has been turned to a truly cylindrical surface, it is made to receive plates of metal, formed of a fusible alloy of lead, tin, and nickel.

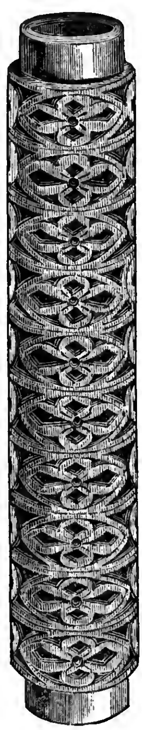

Fig. 386.

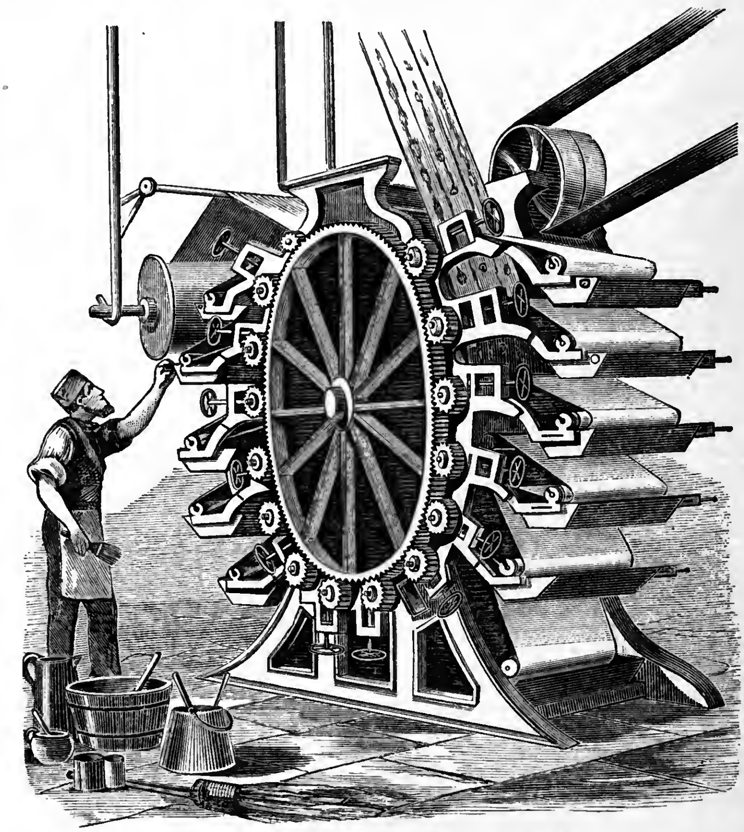

Fig. 387.—Machine for Printing Paper-Hangings.

These plates are simply casts from a single carved wooden mould of the pattern, which has thus only once to be formed by hand. The plates are readily bent when warmed, and are thus applied to the cylindrical surface, to which they are then securely attached. It is found advantageous to cover the prominent parts of the rollers which produce the impressions with a thin layer of felt, as this substance takes up the colors much more readily than wood or metal, and leaves a cleaner impression. — The machine by which wall-papers are printed is represented in Fig 387, where it will be observed that the impression cylinder has a very large diameter, and that a portion of its circumference forms a toothed wheel, which engages a number of equal-sized pinions placed at intervals about its periphery. Each pinion being fixed on the axle of a pattern-bearing roller, these are all made to revolve at the same rate. There is, however, some adjustment necessary before that exact correspondence of the impressions with each other is secured, which is shown on the printed pattern by each color being precisely in its appointed place. The rollers are constantly supplied with color by endless cloths, which receive it from the troughs that are shown in the figure, one trough being appropriated to each roller. Some of these machines can print as many as eighteen or twenty different colors at once, by having that number of rollers; and it is easy to see how, by dividing each trough into several vertical compartments, in each of which a different color is placed, it would be possible to triple or even quadruple the number of colors printed by one machine. — The arsenic used in green colors for paper-hangings has lately been found injurious to the health of persons living in rooms so papered This branch of industry has made considerable advance in this country, and only the finest class of hangings are now coming to us from France, Germany, England, and Belgium. For the year 1879 the value of our imports was $106,933. — A piece of paper contains about 63 superficial feet. French room-papers, however, vary in length and breadth, according to quality.

Leather-paper, "a mode of preparing paper, in which it is made to assume the appearance of leather. The Japanese process is about as follows: Sheets are damped and laid in pairs between sheets of varnished paper, which have a crinkled grain running in one direction. They are then wound upon a roller, the grain of the pattern of the paper derived from the crinkled sheets between which it was laid running around the roller. The roller being slipped out, the roll of paper is slipped into a cylinder and subjected to endwise pressure, reducing it to three quarters its original length. It is then unwrapped and pressed to remove the deep marks. It is then again rolled, colored, oiled, varnished, pressed, and dried. By means of parallel or cross lines on the rollers, the upper surface of the paper is made to resemble leather exactly in all its varieties. The paper being pressed to one third, or even to one half, its original thickness, and the passage through the rollers giving it a fine-grained appearance, makes it valuable to picture-printers, as the surface has the appearance of crêpe silk. There is another variety of leather-paper which is smooth and transparent, resembling hog-skin very much. This is manufactured by a process of hammering, and is the higher priced." — *Knight's American Mechanical Dictionary.*

Marble Paper is paper ornamented with a colored pattern in which the colors are so blended and contrasted as to more or less resemble marble.

Straw Paper is now very largely used; but its adoption has been somewhat checked recently by the surprising advance in the use of *esparto*. Numerous patents have been obtained for working up straw into paper; the process is always difficult and expensive, and only a few of the methods have been really profitable. The conversion of the straw into pulp involves many operations of cutting, boiling, bleaching, draining, steaming, pulping, etc.; each manufacturer preferring his own patented method. In most cases a portion of rag is mixed with the straw to lessen the brittleness. The mode of treating the pulp when once made is nearly as described in paper-manufacturing.

Imp. duty: All rags, grasses, and pulp of grasses, for the manuf. of paper, free. — Sheathing, 10 per cent. — All manuf. of paper n. o. p. f., 35 per cent. — "Half-stuff," pulp, 20 per cent. — Printing-paper, unsized, used for books and newspapers exclusively, 20 per cent. — Sized and glued paper, suitable only for printing-paper, 25 per cent. — Paper stock, crude, of every description, free; paper stock, pulp, 20 per cent. — Real gold and silver paper, in sheets, strips, or other forms, 40 per cent; imitations of, 35 per cent. — Paper fish and paper balloons, as children's toys. — Cigarette-paper, 75 per cent.

Paper, a term for a note or draft that is given in payment of an indebtedness, or for the purpose of raising money, and hence divided into "business paper," which is given as payment for an actual indebtedness, and "accommodation paper," given for the purpose of raising money and not for an indebtedness, which is made payable to the order of a person who consents to act as endorser, either as an accommodation to a friend, or for having a percentage for so doing.

Paper Bags, small bags for grocers, confectioners, and other retailers.

Paper Box. See PAPER.

Paper Floor-cloth, a substitute for oil-cloth, consisting of one or several sheets of thick paper treated with paints or varnish. It is used for floor covering and other purposes.

Paper-Folder, a piece of bone, ivory, wood, shell, or metal, in the shape of a knife for folding sheets.

Paper-Hangings. See PAPER.

Paper-Holder, an upright inclined frame to stretch a newspaper for reading.

Paper-Knife, a knife for smoothing or folding paper, and for cutting the leaves of books.

Paper-Mill, the works where a paper manufactory is carried on.

Paper-Shade, a cover or shade for a table-lamp glass, or a paper frame on wire for a gas-light burner, to moderate the intense light.

Paper-Stainer, a manufacturer of paper-hangings.

Paper-Warehouse, the stores of a paper-maker; a retail store for the sale of paper, often carried on combined with the trade of bookseller and stationer.

Paper-Weight, a fancy ornament for keeping loose letters or papers on a table or desk from blowing about.

Papeterie [Fr.], a paper-mill; the stationery trade; a fancy case with a stock of writing-paper.

Papier [Fr.], paper; a writing.

Papier-Mâché, a name given to articles manufactured of the pulp of paper, or of old paper ground up into a pulp, bleached, if necessary, and moulded into various forms. This article is used upon an extensive scale for the manufacture of mouldings, rosettes, and other architectural ornaments; pilasters, capitals, and even figures as large as life, have also been made of it. It is lighter, more durable, and less brittle and liable to damage than plaster, and admits of being colored, gilt, or otherwise ornamented. Another article sometimes goes under the same name which is more like pasteboard, consisting of sheets of paper pasted or glued and powerfully pressed together, so as to acquire, when dry, the hardness of board, and yet to admit, while moist, of curvature and flexure: tea-trays, waiters, snuff-boxes, and similar articles are thus prepared, and afterward carefully covered by Japan or other varnishes, and often beautifully ornamented by figures or landscapes and other devices, etc., occasionally inlaid with mother-of-pearl. A mixture of sulphate of iron, quicklime, and glue, or white of egg, with the pulp for *P.-M.*, renders it to a greater extent water-proof; and the further addition of borax and phosphate of soda contributes to make it almost fire-proof. It is owing to the rapidity with which moulds of *P.-M.* can be taken from type, that daily newspapers can now be stereotyped. — A stronger and lighter substitute for *P.-M.*, called *carton-pierre*, is made of paper-pulp, whiting, and glue. This is mostly used for architectural ornaments. — *Imp.* duty, 35 per cent.

Papua, or NEW GUINEA, one of the largest islands in the world, being almost equal in extent with Borneo. It belongs to the Eastern Archipelago, is comprised in the Australasian division of Oceanica. It is separated from the N. point of Australia by Torres Strait, and lies between lat. 0° 6′ and 11° S., lon. 131° and 151° E. Its length from N. W. to S. E. is about 1,500 m.; maximum breadth, 400 m.; area, about 300,000 sq. m. Its inhabitants, divided into many tribes,

belong to the Papuan race, black and woolly-haired, but not unlike the Europeans in their facial expression. The climate is extremely unhealthy. The Dutch claim the possession of nearly half the island, but have only there some stations trading with the Moluccas. The coast has been lately partly surveyed by Capt. Moresby of the British army, but the country itself is very little known, and therefore of no commercial interest.

Papyrus. See PAPER.

Par, a state of equality; the original nominal price or full value of a security or money. In stocks and shares, *above par* means at a premium, or above the original value; *below par*, at a discount. — *Par of Exchange.* When two things of different denominations are equal to each other in value, they are then said to be at par. See EXCHANGE.

Para. See BRAZIL.

Parachute, an apparatus shaped like an umbrella, with a suspended car, in which an aeronaut descends from a balloon.

Paradise-Bird. See BIRD OF PARADISE.

Paradise-Grains. See GRAINS OF PARADISE.

Paraffine, a waxy substance obtained from bituminous coal and shales, and many other organic substances, but now more especially from crude petroleum, by distillation and rectification by treatment with solution of caustic soda, and subsequently with sulphuric acid. It is a white, hard, translucent body, resembling spermaceti, melting at 110°, and burning with a bright white flame; sp. gr. 0.877. It is insoluble in water, but is readily dissolved by alcohol and ether, and combines in all proportions with wax, stearine, palmitine, and resin. It is extensively used in the manufacture of candles; also for stoppers to acid bottles, to coat paper for photographic uses, as a lubricator, as burning oil, to preserve meat, fruit, and timber, to coat pills, to refine alcohol and spirits, to prevent the oxidation of metals, as a varnish for leather, as a disinfectant agent, etc. The value of our exports of paraffine wax for the year 1879 was $301,976.—*Imp.* duty, 10 cents per lb.

Parage [Fr.], a roadstead near a harbor.

Paragraph, a short piece of news or notice in a newspaper. — A distinctive subdivision of a book, sometimes marked thus ¶.

Paraguay, one of the smallest States of South America, and the only one without any seaboard, situate between lat. 22° 4′ and 27° 35′ S., lon. 54° 32′ and 58° 40′ W. Its area is computed at 56,700 sq. m., enclosed within the rivers Parana and Paraguay; and was estimated to contain, prior to the late war, a population of 1,400,000; but this has been very considerably reduced, and at the beginning of 1873 the number of the inhabitants, according to an official return, was reduced to 221,079 souls, comprising 28,746 men and 106,254 women over 15 years of age, with 86,079 children, the enormous disproportion between the sexes, as well as the vast decrease of the population, telling the result of the war against the united armies of Brazil, Uruguay, and the Argentine Republic. A new constitution, proclaimed in 1870, is modelled closely on that of the Argentine Confederation. Asuncion, the capital, stands on the E. bank of the river Paraguay, in lat. 25° 16′ S., lon. 57° 42′ W., 650 m. N. of Buenos Ayres.

Unlike the open countries surrounding it, P. is well wooded, and among its trees are many valuable in the arts and manufactures. It also abounds in medicinal products, as rhubarb, sarsaparilla, jalap, sassafras, dragon's blood, copaiva, nux vomica, liquorice, ginger, etc., all of the finest quality. Of dyestuffs, too, there is an immense variety; as cochineal, indigo, vegetable vermilion, saffron, etc. Many of the forest trees yield valuable gums, and they comprise some of the most delicious perfumes and incense that can be imagined. Others, again, are like amber, hard, brittle, and insoluble in water. The *seringa*, or rubber-tree, and also the *palosanto*, which produces the gum-guiacum, crowd the forests, and the sweet-flavored vanilla is abundant. Upon the hills the celebrated *yerba maté*, or Paraguay tea, flourishes luxuriantly. The cultivated products are sugar-cane, cotton, tobacco, rice, mandioca, Indian corn, etc. On the plains thousands of cattle range, and large quantities of hides, hair, horns, bones, tallow, etc., are lost for want of transportation. The country is not celebrated for its minerals, but in all that constitutes an agricultural country, rich lands, a fine climate, and abundance of water, it has no equal. Previous to the war of 1865-1870, P. had no public debt, and its finances were in a very prosperous condition; but it is now almost hopelessly bankrupt. The only railroad is a short line of 45 m., from Asuncion to P.; and there are no lines of telegraph but one at the side of this railroad. The total commerce of the republic is very small, and there is no direct intercourse with the U. States.

Paraguay Tea, or **Maté**, the leaves of the *yerba maté* (*Ilex Paraguensis*). This plant, which is, in fact, a species of holly, occupies the same important position in the domestic economy of S. America that the Chinese plant does in this country. The leaves are prepared by drying and roasting, — not in the manner of the Chinese teas, in which each leaf is gathered separately, but small branches with the leaves attached to them are cut from the plant, placed on hurdles over a wood fire, roasted, and then beaten on a hard floor with sticks. The dried leaves and stems thus knocked off are collected, reduced to powder, and packed in hide sacks. Each of these sacks, when full, contains from 200 to 250 lbs. of the tea. The sacks are sewed up, and as the hide dries and tightens by exposure to the sun over its contents, at the end of a couple of days the tea forms a substance as hard as stone, and almost as heavy. As found in commerce, Paraguay tea is, therefore, in the form of a greenish-yellow powder, mixed with broken leaves and stems. This is infused in boiling water, and the decoction is drunk, or rather sucked up, by means of a tube perforated with small holes. It is usually imbibed out of a small gourd or cup, with a little sugar, and sometimes an aromatic is added, such as orange or lemon-peel, or cinnamon, to give it an additional flavor. Maté is generally disagreeable to those unaccustomed to its use, but a taste for it is soon acquired, and it is very refreshing and restorative to the human frame after great fatigue. It has been calculated that 40,000,000 lbs. of Paraguay tea are annually consumed in the various S. American Republics. Its consumption has, however, much diminished of late in Buenos Ayres, where it now brings 25 cents a pound.

Parah, an East Indian measure of capacity, two feet square and six and a half inches deep.

Parallel-Ruler, a mathematical instrument formed of two flat equal rulers, connected by movable cross-bars, and used for drawing parallel lines.

Paramaribo. See GUIANA (DUTCH).

Paramatta, a kind of bombazine, the weft of which is worsted, the warp of cotton.

Para-Nut, a name for Brazil-nut.

Parapluie [Fr.], an umbrella.

Parasang, the Persian league, an itinerary measure, = 3¾ miles, or 6,086 yards.

Parasol, a silk sunshade or complexion-protector, carried by ladies, being an umbrella on a smaller scale, and more tastefully made.

Parasol-Handle, the stick or support for the frame, etc., of a parasol, which is made of wood, bone, or ivory.

Parasol-Ring, a ring to keep the framework of a parasol closed, made of metal, ivory, or other substance.

Parbuckle, single ropes (Fig. 388) passed round a spar or cask to hoist or lower it by.

Parcel, a term indifferently applied to small packages of wares, and to large lots of goods. In this latter sense, 20 hhds. of sugar or more, if bought at one price, or in a single lot, are denominated "a parcel of sugar."

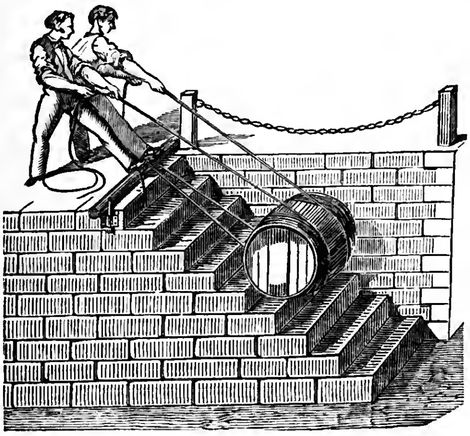

Fig. 388. — PARBUCKLE.

Parcel-Book, a merchant's register book of the despatch of parcels.

Parcelling, a nautical term for wrapping ropes, etc., with pieces of tarred canvas, to protect them from friction.

Parchment and **Vellum**. The former consists of the skins of sheep and goats, and the latter of those of calves, prepared in such a manner as to render them suitable for being written upon, for covering books, and other purposes. The consumption of these articles is very considerable. In this and most other countries it is customary to use them instead of paper in the drawing up of a great variety of deeds and other legal instruments. They are also extensively used, especially in Italy, in the binding of books. The finest copies of the magnificent classics which issued from the Dutch presses in the 17th century, and the early part of the 18th, were all bound in vellum. Parchment is coarser than vellum, and not so well adapted for writing upon. The qualities of both articles differ very widely; so much so that the best parchment is preferable to inferior or even middling vellum. The goodness of each depends partly on the quality of the skins of which they are made, and partly, and indeed in a very high degree, on the care and skill with which they are manufactured. — *Vegetable Parchment* is made of unsized paper, soaked in dilute sulphuric acid. The paper undergoes a very remarkable change by this simple process; it becomes nearly as tough as parchment, and for some purposes of writing and drawing is preferred to it. — *Imp.* duty, 30 per cent.

Parchment-Coffee, coffee stripped from the pulp, and prepared in a particular manner in the West Indies.

Parchment-Cuttings, the trimmings and clippings of prepared skins, which are used for making size.

Pardessus, a lady's over-garment, of fur, etc.

Pare, to peel; to thin down; to cut off gradually.

Paregoric, a soothing sirup for coughs.

Parement [Fr.], the facings of garments.

Parère [Fr.], the opinion of merchants on questions of trade.

Parget, gypsum or plaster-stone; rough plaster, as for the interior of a chimney or roof.

Parian, a beautiful white marble from the Grecian island of Paros. — Also, the name given, from its resemblance to Parian marble, to a substance now used for statuettes and small busts, differing from ordinary porcelain chiefly in containing soft felspar instead of Cornish stone. A small percentage of oxide gives that delicate cream-colored tint which distinguishes *P.* The substance is not pressed into form, or worked with the fingers; but the *P.*, as a creamy liquid, is poured into a mould. As it shrinks greatly during the baking, the artist has to exercise much skill in arranging that the size and form should be accommodated to the shrinking. The small busts and statuettes in what is called *biscuit*, or unglazed white ware, are not equal in appearance to those of *P.*; they have not the same warmth of tint, softness of outline, or translucency of surface.

Paring-Knife, a bookbinder's tool; a knife for thinning down or paring anything.

Paris. See FRANCE.

Paris Plaster, a paste made from gypsum or selenite, so called from being prepared in large quantities from extensive strata at Montmartre, near Paris. It is employed for taking impressions from moulds, and for making statues. Mixed with lime, it is called *stucco*, and is formed into cornices and ornaments for ceilings.

Park, a fire-insurance Co., located in New York City, and organized in 1853. *Statement*, Jan. 1, 1880: Cap. stock paid up, $200,000; net surplus, $89,737. Risks in force, $7,236,083; premiums, $51,789. Premiums received since the organization of the Co., $2,305,519; losses paid, $1,132,071; cash dividends paid to stockholders, $654,000.

Parmesan. See CHEESE.

Parquetry, the name given to a material for flooring and panelling, made up of several pieces of oak or some other kind of wood, disposed according to some particular pattern. If two or more kinds of wood are used, the differences in color and grain develop the pattern very distinctly; if only one kind, the pattern is produced by placing the grain of the wood in different directions. Sometimes *P.* is veneered, but more usually the pieces are about an inch thick, and are used as flooring.

Parral, a collar of greased rope supporting yards to the mast in a ship.

Parrot, a well-known talking bird, a species of *Psittacus*, several of which, as the gray and the green, are favorite cage birds, and largely dealt in by bird fanciers.

Parrot Coal, a kind of English coal that burns very clearly.

Parsley, a well-known culinary herb, the *Petroselinum sativum*, with its varieties, *P. hortense* and *P. crispum*.

Parsling, a nautical term for wrapping or covering ropes, etc., with coarse canvas.

Parsnip, the *Pastinaca sativa*, an umbelliferous biennial plant, cultivated for its edible root, which contains 85.5 water, 7.30 albuminoids, 2.88 sugar, 6.77 other carbohydrates, besides a small amount of oil and inorganic matter. An ardent spirit of excellent quality is obtained from it, and parsnip wine is said to possess a fine flavor.

Part, a portion or share. — A character or personage in a play.

Parting, the operation of separating silver from

gold by an acid. — In paper-making, separating the moistened sheets. — In navigation, a ship breaking her cable, and leaving her anchor in the ground.

Partner, an associate; the member of a firm; one who has a joint share, interest, or business-stake with another in any concern or speculation.

Partnership is a contract by which two or more persons agree to bring together certain articles of property, or valuable acts of service, uniting the commercial proceeds in a common fund, divisible according to some particular rate among the partners. One may bring money, another may bring his industry, a third may bring professional talent, and a fourth, perhaps, his mere name and influence in society, as their respective contributions to the common stock; the pecuniary results of which may be distributed among these partners in proportions of corresponding variety. The position of a partner being, as between the parties themselves, beneficiary, will require something more to prove it than the mere consent of the individual. As respects third parties, however, the partner's condition being onerous, there are acts of his own which will be sufficient to place him in that position; hence arises the natural division of the law of *P.* into the obligations of partners to each other, and the obligations of partners to the public.

Obligations between the Partners. All persons free to contract may enter into *P.* with each other for any lawful purpose; and it may be formed either by a regular contract, or by the mere act of mutual trading. In the former case, the contract rules all transactions. A majority cannot alter it, or go beyond its limits, against the will of the minority, unless it be part of the agreement that a majority may bind the whole. There is a choice of persons in a *P.*, and so a majority cannot force a new partner on the minority. The executors of a deceased partner are not allowed to occupy his place, unless there be a stipulation to that effect in the contract. The nature of the *P.*, however, may be such that, instead of there being a choice of persons, any one who performs certain conditions is entitled to be a member, as in the formation of a joint-stock company, where scrip is publicly sold. The respective amounts of profit and loss accruing to the partners will generally be provided for by the deed of *P.* Where there is no deed, or no provision on the subject, equality is presumed. The *P.* is considered in law a distinct person from the individuals forming it. The property which each individual brings into the concern becomes the property of the company, and ceases to be that of the individual. When there is capital embarked in the concern by one party, and not by others, it will almost always be the case that the prospective right of property in the stock, as distinct from the profits, will be fixed by agreement; and the cases where this has not taken place are so few that the law is not very distinct on the point. In one class of *P.* only — adventures — does there appear to be a general rule, which is, that if a person agree to be interested in the profit and loss of an adventure, this agreement alone will not constitute him a partner in the goods which are the subject-matter of the adventure. — An individual partner may buy or borrow from the firm, and the firm may do so from him. The partners are individually bound to the company as its accredited agents, in which capacity they are not allowed to entertain a separate interest from it, by secretly carrying on the business for which the *P.* was established, or by using the knowledge acquired in its affairs for the purpose of competing with the *P.* in purchases, etc. Any advantages that may happen to be so acquired by individual partners are generally adjudged to be held by them in trust for the company. The *P.* has a claim upon the time and attention of each partner, either in terms of the agreement, or in accordance with the circumstances, where there is no special provision. The position in which the person was placed before the *P.* commenced will affect such a question; thus, professional manufacturers entering into *P.* with an attorney in good practice, whom they know to be fully occupied with his profession, would undoubtedly not be entitled to insist on his bestowing the same attention on the manufacturing business as themselves. A partner entitled to share in the profits is not, without express stipulation, entitled to special remuneration for any amount of attention which he may bestow on the business of the establishment. — If the partners differ with each other on points such as those just discussed, the courts will not, in any ordinary case, interfere to settle the accounts between them without a dissolution. Where there are articles of *P.* there is a remedy in the courts of common law for breach of performance of the stipulations. Where there are no articles the remedy, by account between the partners, can only be had in the courts of equity. Where an account has been taken and a balance struck, a partner may sue at law for what appears due to him on that balance; and he may so sue for cash advanced by him to his partner before the *P.*

Obligations to the Public. We now come to consider the manner in which persons become liable to the public as partners. A man becomes a partner by allowing the world in general to presume that he is one; as, by having his name on the sign of a store, or on the bills of parcels, invoices, or accounts, or by putting his name to the negotiable instruments drawn on the firm. Where there are such manifestations of *P.*, the party continues to be liable, though notice of dissolution should be given in the newspapers; and it is even said that he will be liable, though the person claiming against him was ignorant at the time when he contracted of the circumstances so inferring liability, and was not induced to contract with the firm by the belief that such a person was liable as a partner for its engagements. Where A took a promissory note from a firm, B stating that he had retired from the firm, but that it had been stipulated that his name should remain in it for some days, within which days the note was drawn, B was held liable. A person will not continue liable, however, for the remissness of his partners in neglecting to disconnect his name with the company, if he has not given his consent to its remaining, and if he has taken all proper steps to give notice to all concerned. This is generally accomplished by advertisement in the newspapers, and by special notice to the parties with whom the firm has dealings. But there may be circumstantial notice, which a party will have to disregard at his own peril; as where there is a change in the wording of the checks, bills, invoices, etc. The advertisement in the local newspapers is sufficient notice to all who have not had dealings with the concern. — Persons intending to agree for a share of the profits as the remuneration of labor generally involve themselves in the liability of a partner. If a person agree to pay another for his labor in a concern a given sum, in proportion to a given quantum of the profits, it has been considered to be settled that this does not constitute a *P.* as to third persons, but that it does constitute a *P.* if

he have a specific interest in the profits themselves, as profits. An agreement that a broker shall have for his profit whatever he can obtain upon the sales above a certain sum does not constitute *P.*; but one coal-dealer having agreed with another to bring customers to the concern, receiving in return an annuity, and 50 cents for every chaldron sold, was held a partner, she having allowed her name to be used. If the company be accommodated with money, the interest or return for which rises and falls with the profit, it will undoubtedly make the lender a partner. In short, it may be safely taken as a rule that, where any one has an interest in a concern, the extent of which is solely measured by the result of the transactions of that concern, he is liable to the world as a partner. When the circumstances on their original merits are sufficient to found such responsibility, it will not affect the matter that the individuals have otherwise arranged with each other, or even that third parties were ignorant of the responsibility of an implied partner, and dealt without regard to his credit. — Each partner is liable to the full extent of all he possesses for the general obligations of the company, and each is its accredited representative, entitled, like an agent, to bind it to all suitable obligations. A partner can only engage the company in simple contracts; he cannot bind it by deed, unless he be expressly empowered by deed to do so. Although a partner be thus empowered by implied mandate to bind the company and his copartners in acts of ordinary administration, and in the usual course of trade, he holds no such power to bind in extraordinary acts out of the usual course. Thus, a reference to arbitration will not bind the company, if signed or agreed to by one of the partners, unless expressly agreed to or homologated by the rest, or by the company. The engagements which a single partner can bind the company to must be acts of administration naturally connected with the business of the *P.* A reference to arbitration and a guarantee are out of the ordinary course of business, and would require special authority; but a partner may pledge the goods belonging to the company. The transaction does not require to be strictly confined to the line of trade, as defined in the articles of *P.* The powers of individuals may there, it is true, be limited; but the public, not aware of the limitation, are not bound by it, and, when they see a partner ready to transact in the name of the firm such operations as it is natural that he would have to transact in the course of the business for which the company exists, they are entitled to place faith in him. Negotiable instruments are presumed to be in the way of business of every description of commercial *P.*, and so each partner is entitled to draw, accept, and endorse bills and notes for the company. If a bill be drawn on the *P.* by its usual collective name, and be simply accepted by one member signing his own name, he will bind the whole. But it is essential to this species of obligation, as to others, that it have the appearance of being contracted for the behoof of the firm, and in the course of its legitimate business. In *P.* purely commercial the presumption will always be in its favor, but it is otherwise in farming and mining speculations; the presumption here is *against* the negotiable instrument being in the usual course of the business of the firm, but it may still be *proved* to be so. In a *P.* where no capital is required, it is clear that one partner cannot bind the others in negotiable instruments. — A partner being in the eye of the law the agent of the company, many analogies may be drawn to illustrate his powers from the authority of agents to bind their principals in the course of ordinary transactions; and it may be inferred that, where the partner exceeds his proper power, the firm, or another partner, as the case may be, may adopt the act as the principal does that of his agent. (See PRINCIPAL AND AGENT.) The obligation having been incurred by the partner in the name of the firm, and being within his express or implied authority, his subsequent fraudulent application of the consideration to his own use will not affect the responsibility. Thus, where a partner bought for the company, who were harness-makers, a number of bits for bridles, and immediately pawned them for his own use, the other partners in vain endeavored to defend themselves on the plea that the articles had never gone into the company's stock, and that the transaction was a simple fraud by one of the partners. If the person dealing with the partner, however, be accessory to the fraud, or if he know or suspect that a fraud is to be committed, or if he be placed in a situation in which a man of ordinary discernment ought to know or suspect that the partner is exceeding the limits of his authority, the other partners will not be liable. Where an individual takes from a partner a security in the name of the firm, for a debt due by the individual partner, fraud or such negligence as will free the other partners is always presumed, subject of course to proof on the part of the creditor that he had every reason to believe that the partner acted within his authority. Where a debt incurred for the partner himself, but in the name of the firm, is liquidated by such a security, the presumption is against the other partners. Negotiable instruments bearing the *P.* name, though obtained by collusion with an individual partner, are good against the others in the hands of onerous and *bona fide* holders. (See BILL OF EXCHANGE.) — As a counterpart to the power of the individual members to bind the company, those who contract with such individuals will in similar circumstances be bound *to* the company. Thus, where a member sells *P.* goods, though in his own name, the company may sue for the price. They cannot, however, make the third party suffer for the fraud of the partner; and so, if the purchaser was creditor of the partner at the time of the purchase, he is allowed to set off the two sums against each other; for the chance of set-off may have been the inducement to the bargain. It is a general doctrine that the rights of the firm against third parties may be released by any one of its members, and payment to one is in all cases payment to the whole, unless there be fraud committed and connived at by the payer.

Dissolution. A limit to the *P.* may be fixed in the articles, and if not definitely fixed, may be deduced from circumstances. A *P.* is not, however, dissolved by the mere expiration of its period of continuance, it is merely then terminable; and if the parties continue to transact business as usual, an indefinite *P.* is entered on. A *P.* may be dissolved before the arrival of the period to which its duration is fixed, on just cause, such as, that the object of the association is impracticable, or that the further pursuit of it would be attended with inevitable loss, or that one of the partners has become insane. When all the partners agree, the company may of course be at any time dissolved, notwithstanding any previous stipulation to the contrary. A *P.* at will, or without any specified limit, may be dissolved at the pleasure of any one partner. But a partner is not entitled suddenly to dissolve the connection for the purpose of taking his colleagues by surprise, and immediately pursu-

ing the *P.* business for his own advantage. Where a partner attempts such a project, he will have to communicate the advantage to his colleagues, as when one partner obtained a renewal of the lease of the company's premises, without warning the others of his intention to apply for it. The death of a partner operates as a dissolution, unless it be stipulated that his representatives are to succeed to him, in which case the obligation is a right in which they represent their predecessor. Bankruptcy of the company, and, we think, of any partner, dissolves the *P.* — After an act of dissolution, a *P.* exists only for the purpose of winding up its affairs, by converting the estate with all expedition into money, and dividing the proceeds among the partners. It is often agreed that the business of winding up is to be transacted by one member of the company, but the partners still continue liable for his transactions with third parties, so far as consistent with the powers which the public may have reason to suppose that he has been intrusted with. When it is known that the *P.* is dissolved, such a person will not be entitled to pledge the credit of his copartners to a negotiable instrument. It is one of the privileges of a partner to insist, on occasion of dissolution, that all the *P.* property be brought to public sale.

Limited Partnership is a description of partnership in which one or more partners put in a certain amount of capital, which is liable for the contracts of the firm; but beyond this the party or parties are not liable. This sort of *P.* is particularly provided for in the French code, and is not unfrequent in France. It is a very useful provision of the law that allows of such associations, for it enables persons of fortune, and retired from business, to put a part of their capital at risk in trade, without risking their whole property; and it accordingly operates very favorably upon the enterprise of the community; for a young man who has only his talents and industry to put into a concern can thus more easily obtain the capital necessary to give his activity and enterprise scope, and every community ought to open all practicable channels for the intellectual and physical exertions of its members. This species of *P.* has accordingly been partially introduced into the U. States, being provided for in the code of Louisiana, which is modelled on the French code, and having been authorized by statute in New York, Massachusetts, Rhode Island, Connecticut, Vermont, New Jersey, Pennsylvania, Maryland, South Carolina, Georgia, Alabama, Florida, Mississippi, Indiana, Michigan, and other States. The condition of a limited *P.* is that the name of the person whose liability is thus limited must be used in the firm, and particular provisions are made as to paying in the amount of capital stipulated; and another suitable provision in such case is the provision for some registry by which it may appear to those who wish to make the inquiry what amount such partner pays in. See CORPORATION, and JOINT-STOCK COMPANY.

Limited Partnership in New York. 1. According to the Revised Statutes of the State of New York, limited *P.* for transaction of any mercantile, mechanical, or manufacturing business within the State may be formed of two or more persons; but the provisions of the act will not authorize any such *P.* for the purpose of banking or making insurance. — 2. Such *P.* may consist of one or more persons, who shall be called general partners, and who shall be jointly and severally responsible, as general partners now are by law; and one or more persons who shall contribute, in actual cash payments, a specific sum as capital to the common stock, who shall be called special partners, and who shall not be liable for the debts of the *P.* beyond the fund so contributed by him or them to the capital. — 3. The general partners only shall be authorized to transact business and sign for the *P.*, and to bind the same. — 4. The persons desirous of forming such *P.* shall make, and severally sign, a certificate, which shall contain: I. The name or firm under which such *P.* is to be conducted. II. The general nature of the business to be transacted. III. The names of all the general and special partners interested therein, distinguishing which are general and which are special partners, and their respective places of residence. IV. The amount of capital which each special partner shall have contributed to the common stock. V. The period at which the *P.* is to commence, and the period at which it shall terminate. — 5. The certificate shall be acknowledged by the several persons signing the same, before the Chancellor, a Justice of the Supreme Court, a Circuit Judge, or a Judge of the County Courts; and such acknowledgment shall be made and certified in the same manner as the acknowledgment of conveyance of land. — 6. The certificate so acknowledged and certified shall be filed in the office of the clerk of the county in which the principal place of business of the *P.* shall be situated, and shall also be recorded by him at large in a book to be kept for the purpose, open to public inspection. If the *P.* shall have places of business situated in different counties, a transcript of the certificate, and of the acknowledgment thereof, duly certified by the clerk in whose office it shall be filed, under his official seal, shall be filed and recorded in like manner in the office of the clerk of every such county. — 7. At the time of filing the original certificate, with the evidence of the acknowledgment thereof, as before described, an affidavit of one or more of the general partners shall also be filed in the same office, stating that the sums specified in the certificate to have been contributed by each of the special partners to the common stock have been actually and in good faith paid in cash. — 8. No such *P.* shall be deemed to have been formed until a certificate shall have been made, acknowledged, filed, and recorded, nor until an affidavit shall have been filed, as above directed; and if any false statement be made in such certificate or affidavit, all the persons interested in such *P.* shall be liable for all the engagements thereof as general partners. — 9. The partners shall publish the terms of the *P.*, when registered, for at least six weeks immediately after such registry, in two newspapers, to be designated by the clerk of the county in which such registry shall be made, and to be published in the senate district in which their business shall be carried on; and if such publication be not made, the *P.* shall be deemed general. — 10. Affidavits of the publication of such notice, by the printers of the newspapers in which the same shall be published, may be filed with the clerk directing the same, and shall be evidence of the facts therein contained. — 11. Every renewal or continuance of such *P.* beyond the time originally fixed for its duration shall be certified, acknowledged, and recorded, and an affidavit of a general partner be made and filed, and notice be given in the manner herein required for its original formation; and every such *P.* which shall be otherwise renewed or continued shall be deemed a general *P.* — 12. Every alteration which shall be made in the names of the partners, in the nature of the business, or in the capital or shares thereof, or in any other matter specified in the original certificate, shall be deemed a dissolution of the *P.*; and every such *P.* which shall in any manner be carried on after any such alteration shall have been made, shall be deemed a general *P.*, unless renewed as a special *P.*, according to the provisions of last section. — 13. The business of the *P.* shall be conducted under a firm, in which the names of the general partners only shall be inserted, without the addition of the word "Company," or any other general term; and if the name of any special partner shall be used in such firm, with his privity, he shall be deemed a general partner. — 14. Suits in relation to the business of the *P.* may be brought and conducted by and against the general partners, in the same manner as if there were no special partners. — 15. No part of the sum which any special partners shall have contributed to the capital stock shall be withdrawn by him, or paid and transferred to him, in the shape of dividends, profits, or otherwise, at any time during the continuance of the *P.*; but any partner may annually receive lawful interest on the sum so contributed by him, if the payment of such interest shall not reduce the original amount of such capital; and if, after the payment of such interest, any profits shall remain to be divided, he may also receive his portion of such profits. — 16. If it shall appear that, by the payment of interest or profits to any special partner, the original capital has been reduced, the partner receiving the same shall be bound to restore the amount necessary to make good his share of capital with interest. — 17. A special partner may, from time to time, examine into the state and progress of the *P.* concerns, and may advise as to their management; but he shall not transact any business on account of the *P.*, nor be employed for that purpose as agent, attorney, or otherwise. If he shall interfere contrary to these provisions, he shall be deemed a general partner. — 18. The general partners shall be liable to account to each other, and to the special partners for their management of the concern, both in law and equity, as other partners now are by law. — 19. Every partner who shall be guilty of any fraud in the affairs of the *P.* shall be liable civilly to the party injured to the extent of the damage, and shall also be liable to an indictment for a misdemeanor, punishable by fine or imprisonment, or both, in the discretion

of the court by which he shall be tried. — 20. Every sale, assignment, or transfer of any of the property or effects of such *P.*, made by such *P.* when insolvent, or in contemplation of insolvency, or after or in contemplation of the insolvency of any partner with the intent of giving a preference to any creditor of such *P.* or insolvent partner, over other creditors of such *P.*, and every judgment conferred, lien created, or security given by such *P.* under the like circumstances, and with the like intent, shall be void, as against the creditors of such *P.* — 21. Every such sale, assignment, or transfer of any of the property or effects of a general or special partner, made by such general or special partner when insolvent, or in contemplation of insolvency or after or in contemplation of the insolvency of the *P.*, with the intent of giving to any creditors of his own, or of the *P.*, a preference over creditors of the *P.*, and every judgment conferred, lien created, or security given by any such partner under the like circumstances, and with the like intent, shall be void, as against the creditors of the *P.* — 22. Every special partner who shall violate any provision of the two last preceding sections, and who shall concur in and assent to any such violation by the *P.*, or by any individual partner, shall be liable as a general partner. — 23. In case of the insolvency or bankruptcy of the *P.*, no special partner shall, under any circumstances, be allowed to claim as a creditor until the claims of all the other creditors of the *P.* shall be satisfied. — 24. No dissolution of such *P.* by the acts of the parties shall take place previous to the time specified in the certificate of its formation, or in the certificate of its renewal, until a notice of such dissolution shall have been filed and recorded in the clerk's office in which the original certificate was recorded, and published once in each week for four weeks in a newspaper printed in each of the counties where the *P.* may have places of business, and in the State papers.

FORMS.

§ 1. *Articles of Copartnership.— General Form.*

Articles of agreement, made the day of , one thousand eight hundred and , between A. B., of, etc., of the one part, and C. D., of, etc., of the other part, witnesseth, as follows: The said parties above named have agreed to become copartners in business, and by these presents do agree to be copartners together, under and by the name or firm of B. and D., in the business of wholesale dry goods merchants, and in the buying, selling, and vending all sorts of goods, wares, and merchandise, to the said business belonging, and to occupy the store No. , in Street, in the city of ; their copartnership to commence on the day of 18 , and to continue for the term of five years from thence next ensuing, fully to be complete and ended; and to that end and purpose the said A. B. and C. D. have delivered in as capital stock the sum of twenty thousand dollars, share and share alike, to be used and employed in common between them, for the support and management of the said business, to their mutual benefit and advantage.

And it is agreed, by and between the parties to these presents, that at all times during the continuance of their copartnership, they, and each of them, will give their attendance, and do their and each of their best endeavors, and, to the utmost of their skill and power, exert themselves, for their joint interest, profit, benefit, and advantage, and truly employ, buy, sell, and merchandise, with their joint stock, and the increase thereof, in the business aforesaid: And also, that they shall, and will, at all times during the copartnership, bear, pay, and discharge, equally between them, all rents and other expenses that may be required for the support and management of the said business; and that all gains, profits, and increase, that shall come, grow, or arise, from or by means of their said business, shall be divided between them, the said copartners, share and share alike; and all loss that shall happen to their said joint business, by ill commodities, bad debts, or otherwise, shall be borne and paid equally between them: And it is agreed, by and between the said parties, that there shall be had and kept, at all times during the continuance of their copartnership, perfect, just, and true books of account, wherein each of the said copartners shall enter and set down, as well all money by them, or either of them, received, paid, laid out, and expended, in and about the said business, as also all goods, wares, commodities, and merchandise, by them, or either of them, bought or sold, by reason or on account of the said business, and all other matters and things whatsoever to the said business and management thereof in anywise belonging; which said books shall be used in common between the said copartners, so that either of them may have access thereto, without any interruption or hindrance of the other: And also, the said copartners, once in each year, during the continuance of the said copartnership, as aforesaid (to wit: on the day of , in each year), or oftener if necessary, shall make, yield, and render, each to the other, a true, just, and perfect inventory and account, of all the profits and increase by them, or either of them, made, and of all loss by them, or either of them, sustained; and also, of all payments, receipts, and disbursements, and of all other things by them made, received, disbursed, acted, or suffered, in their said copartnership and business; and the same account being so made, they shall, and will, clear, adjust, pay, and deliver, each to the other, at the time, their just share of the profits so made as aforesaid. And the said parties hereby mutually covenant and agree, to and with each other, that during the continuance of the said copartnership, neither of them shall, nor will, indorse any note, or otherwise become surety for, any person or persons whomsoever, without the consent of the other of the said copartners: And at the end, or other sooner determination of their copartnership, the said copartners, each to the other, shall and will make a true, just, and final account of all things relating to their said business; and in all things truly adjust the same and all and every stock and stocks, as well as the gains and increase thereof, which shall appear to be remaining, either in money, goods, wares, fixtures, debts, or otherwise, shall be divided between them, share and share alike.

In witness whereof, the said parties to these presents have hereunto set their hands and seals, the day and year above written.

Signed and sealed in presence of G. H. } A. B. [L. S.]
C. D. [L. S.]

§ 2. *Articles of Copartnership between Country Merchants.*

Articles of agreement made and entered into, this day of , A. D. 18 , between A. B., of, etc., of the one part, and C. D., of, etc., of the other part, witnesseth, as follows: The said A. B. and C. D. have joined, and by these presents do join themselves, to be copartners together, in the business of general country merchants, and all things thereto belonging: and also, in buying, selling, and retailing all sorts of wares, goods, merchandise, and commodities, and all kinds of produce usually kept and sold in a country store, and in such commission business as may appertain to the same; which said copartnership is to be conducted under the name, style, and firm of B. and D., at the village of , in the town of , aforesaid, and shall continue from the day of , 18 , for and during, and unto the end and term of years, from thence next ensuing, fully to be complete and ended:

And to that end and purpose the said parties to these presents have, the day of the date hereof, delivered in as stock, the sum of dollars, share and share alike, to be used, laid out, and employed in common between them, for the management of the said business of merchandising, as aforesaid, to their mutual benefit and advantage: And it is agreed between the said parties to these presents, that the capital stock of the firm hereby constituted shall be made and kept up to the sum of dollars, share and share alike; that the same may at any time be reduced, or extended by agreement between the parties hereto; and that the said capital stock, together with all credits, goods, wares, or commodities bought or obtained by the said firm, by barter or otherwise, shall be kept, used, and employed in and about the business aforesaid; and for that purpose, each partner shall have power to use the name of the firm, and to bind the same, in making contracts and purchasing goods, at the city of New York, or elsewhere, and in otherwise trading, buying, and selling on account of the said firm, and for the benefit and behoof thereof, and not otherwise; provided, however, that neither partner shall contract liabilities in the name and on the credit of the firm, in purchasing and replenishing their stock of goods and merchandise, to exceed the sum of dollars, without the consent of the other partner: And also, that neither of the said copartners shall, or will, during the said term, exercise, or follow, the trade, or business, of merchandising, as aforesaid, in the county of , aforesaid, for his private benefit or advantage; but shall, at all times, do his best endeavor, in and by all lawful means, to the utmost of his skill, power, and cunning, for the joint interest, profit, benefit, and advantage of the firm aforesaid; and truly employ, buy, sell, and merchandise with the stock aforesaid, and the increase and profit thereof, in the business of merchants aforesaid, without fraud or covin; and also, that the said parties shall, and will, at all times during the said copartnership, bear, pay, and discharge equally between them, all rents, and other expenses, etc. [*as in the preceding form to the end; or, insert such other special covenants as the parties may require*].

In witness, etc. [*as in* § 1].

§ 3. *Agreement to renew Partnership, to be endorsed on the Original Article.*

Whereas, the partnership formed by, and mentioned in, the within article of agreement, has this day expired [*or*, will expire on the day of next], by the limitations contained herein: It is therefore hereby agreed, that the same shall be continued, on the same terms, and with all the provisions and restrictions in said agreement mentioned, for the further term of years from this date [*or*, from the day of next]

Witness our hands and seals, this day of , 18 .

In presence of G. H. } A. B. [L. S.]
C. D. [L. S.]

§ 4. *Agreement of Dissolution, to be endorsed on the Original Article.*

By mutual consent of the undersigned, the parties to the within agreement, the partnership thereby formed is wholly dissolved, except so far as it may be necessary to continue the same for the final liquidation and settlement of the business thereof; and said agreement is to continue in force until such final liquidation and settlement be made, and no longer.

Witness, etc. [*as in* § 3].

§ 5. *Certificate of Limited Partnership.**

State of New York, }
County, } ss:

This is to certify that the undersigned have formed a limited partnership, pursuant to the provisions of the Revised Statutes of the State of New York, under the name or firm of B. & D.; that the general nature of the business to be transacted is the buying and selling groceries, and such other articles as are usually dealt in by wholesale and retail grocers: that A. B. and C. D., who respectively reside in the city of New York, are the general partners; that E. F., who resides at , in the county of , in the State of New York, and L. M., who resides at , in the county of , in the State of New Jersey, are the special partners; that the said E. F. has contributed the sum of ten thousand dollars, as capital towards the common stock, and the said L. M. has contributed the sum of five thousand dollars, as capital towards the common stock; and that the said partnership is to commence on the day of , 18 , and is to terminate on the day of , 18 .(*)

Dated this day of , one thousand eight hundred and

A. B.
C. D.
E. F.
L. M.

§ 6. *Certificate of Acknowledgment.*

County, ss:

On this day of , 18 , A. B., C. D., E. F., and L. M., known to me to be the persons described in, and who made and signed, the preceding certificate, came before me, and severally acknowledged that they had made and signed the same.

M. U., Judge of New York Common Pleas.

§ 7. *Affidavit to be filed with the Certificate.*

County, ss:

A. B., of said county, being duly sworn, says that he is one of the general partners named in the above certificate, and that the sums specified in the said certificate to have been contributed by the special partners to the common stock, have been actually and in good faith paid in cash.

Subscribed and sworn before me, } B.
this day of , 18 . }
M. U., etc.

§ 8. *Designation of the Newspapers in which the Publication is to be made.*

Let the terms of the limited partnership between A. B., C. D., E. F., and L. M. be published in the , and the , which papers are published in , in county.

J. C., Clerk of the City and County of New York.

§ 9. *Notice to be published.*

NOTICE OF LIMITED PARTNERSHIP.

Notice is hereby given, that A. B. and C. D., who respectively reside in the city of New York; E. F., who resides at , in the county of , in the State of New York, and L. M., who resides at , in the county of , in the State of New Jersey, have formed a limited partnership, pursuant to the provisions of the Revised Statutes of the State of New York, for the buying and selling groceries, and such other articles as are usually dealt in by wholesale and retail grocers, in which all the parties interested are the said A. B. and C. D., who are the general partners, and the said E. F. and L. M., who are the special partners; that the said E. F. has contributed, etc. [*as in* § 5 *to the* *]. Dated, New York, July 1, 1847.

A. B.
C. D.
etc., etc.

* The certificate must be acknowledged (not proved), before a Justice of the Supreme Court, or a Judge of the County Courts, in the same manner as conveyances of real estate. The affidavit may be made before a Judge, or a Commissioner of Deeds, or the County Clerk.

Part-Owner, one who has a share in a ship, house, or other property.

Partridge, a well-known game bird. The common *P.* (*Perdix cinereus*), does not exist in America. The name *P.* is given in different parts of the U. States to the Canada grouse (*Tetrao Canadensis*), to the ruffled grouse (*Bonasa umbellus*), to the quail (*Ortyx Virginianus*), and to several other birds.

Partridge-Wood, a name for the wood of several trees coming from S. America and the West Indies. The West Indian is the produce of *Heisteria coccinea*. It is used for walking-sticks, umbrella and parasol handles, and a variety of it in cabinet-work and turning. The colors are variously mingled, and most frequently disposed in fine hair-streaks of two or three shades, which in some of the curly specimens resemble the feathers of the bird; other varieties are called pheasant-wood.

Parure [Fr.], a set of pearls and brilliants; articles of ornament, dress, or attire.

Pass, a name for the third classification or quality of Russian hemp. — A free journey-ticket on a railroad. — An unpaid admission to a place of amusement.

Passage, a narrow lane or corridor in a house or building. — A voyage taken by water.

Pass-Book, the account-book in which entries and payments are made for the information of depositors, by banking institutions, savings-banks, etc.

Passementier, a dealer in trimmings in France.

Passengers, in *commercial navigation*, are individuals conveyed for hire from one place to another on board ship. Passage ships are those peculiarly appropriated to the conveyance of *P.* Passage ships are generally placed under certain regulations; and the extent to which emigration is now carried renders it of the utmost importance that these regulations should be carefully compiled. The greater number of emigrants are in humble life: few among them know anything of ships, or of the precautions necessary to insure a safe and comfortable voyage; they are, also, for the most part, poor, and exceedingly anxious to economize, so that they seldom hesitate to embark in any ship, however unfit for the conveyance of *P.*, or inadequately furnished with provisions, if it be *cheap*. Unprincipled masters and owners have not been slow to take advantage of this; and in order to prevent the frauds that would otherwise be practised on the unwary, it has been found indispensable to lay down some general regulations as to the number of *P.* to be taken on board ships as compared with their tonnage, the quantity of water and provisions as compared with the *P.*, etc. But this is no very easy task. If the limitations be too strict, that is, if comparatively few *P.* may be carried, or if the stock of provisions to be put on board be either unnecessarily large or expensive, the cost of emigration is proportionally enhanced, and an artificial and serious impediment is thrown in the way of what should be made as easy as possible, consistent with security. But, on the other hand, if too many *P.* be allowed, their health is liable to suffer; and should the supply of provisions be inadequate, or the quality bad, the most serious consequences may ensue. — In some respects *P.* may be considered as a portion of the crew. They may be called on by the master or commander of the ship, in case of imminent danger, either from tempest or enemies, to lend their assistance for the general safety; and in the event of their declining, may be punished for disobedience. This principle has been recog-

nized in several cases ; but as the authority arises out of the necessity of the case, it must be exercised strictly within the limits of that necessity. A *P.* is not, however, bound to remain on board the ship in the hour of danger, but may quit it if he have an opportunity ; and he is not required to take upon himself any responsibility as to the *conduct* of the ship. If he incur any responsibility, and perform extraordinary services in relieving a vessel in distress, he is entitled to a corresponding reward. The goods of *P.* contribute to general average.

Pass-Key, one that will open several locks.

Pass-Note, in manufacturing districts, a certificate from the occupier or manager of a factory, that the bearer has legally left his last employment.

Passport, an official license or permission to enter or leave a country, still required in several of the continental states of Europe.

By the 21st section of the act of August 18, 1856, the Secretary of State of the U. States is authorized to grant and issue passports, and cause passports to be granted, issued, and verified in foreign countries by such diplomatic or consular officers of the U. States, and under such rules, as the President shall designate and prescribe, for and on behalf of the U. States, and no other person shall grant, issue, or verify any such passport; nor shall any passport be granted or issued to or verified for any other persons than citizens of the U. States; nor shall any charge be made for granting, issuing, or verifying any passport, except in a foreign country ; and in any case the fee allowed therefor shall not exceed the sum of one dollar, nor shall any such charge be made for more than one such verification in any foreign country ; and if any person acting or claiming to act in any office or capacity under the U. States, or any of the States of the U. States, who shall not be lawfully authorized so to do, shall grant, issue, or verify any passport, or other instrument in the nature of a passport, to or for any citizen of the U. States, or to or for any person claiming to be or designated as such in such passport or verification; or if any consular officer who shall be authorized to grant, issue, or verify passports, shall knowingly and willingly grant, issue, or verify any such passport to or for any person not a citizen of the U. States, the person so offending shall be deemed and taken to be guilty of a misdemeanor, and on conviction thereof shall be imprisoned not exceeding one year, or fined in a sum not to exceed five hundred dollars, or both ; and may be charged, proceeded against, tried, convicted, and dealt with therefor in the district where he may be arrested or in custody.

Paste. There are many meanings given to this name in the arts. — A mixture of flour and water constituting ordinary paste, boiled or unboiled (see CEMENT, FLOUR). — The same with alum or resin added, to make shoemaker's and bookbinders' paste.—A mixture of bullock's blood, quicklime, and water, forming *Chinese paste*, a cement for stone, pottery, and wood. — Beeswax and spirits of turpentine form *furniture paste*, a material for polishing wood. — Some or other of many different substances (soft soap, rotten-stone, oxalic acid, olive-oil, turpentine, emery, lard, etc., are combined to make *polishing paste* for brass, iron, pewter, and other metals. — Naples or other soap, with varied perfumes, constitutes *shaving paste.* — The gloss for imitation gems is called paste. — Various confections, dentifrices, and cosmetics obtain the same name. — *Paste*, lastly, is another name for *dough*, in making pies and puddings.

Paste-Board, a wooden board on which dough is rolled out for pastry. — Thick, stiff paper pasted together. (See CARD-BOARD.)

Paste-Brush, a bookbinder's or paper-hanger's brush ; a cook's brush for varnishing pastry.

Pastel, the coloring pulp obtained from the *Isatis tinctoria.* — A crayon formed with any color and gum-water, for painting on paper or parchment.

Paste-Roller, a rolling-pin of wood or glass, for spreading dough.

Pastille, a small fragrant roll of paste ; a small perfumed taper to burn in a room ; an aromatic lozenge or drop.

Pasting-Lace, a narrow kind of coach lace, employed to cover and hide rows of tacks.

Past-Master's Jewel, a freemason's honorary distinction or decoration, worn on the breast, in a lodge, by one who has filled the master's chair.

Pastry, food made of paste, such as pies, puddings, tarts, etc.

Pastry-Cutter, a cook's or confectioner's utensil for cutting dough.

Pastry-Mould, a shape of metal or earthenware, for pastry.

Pastry Whites, a superfine kind of flour used by bakers, also called *firsts.*

Pasture, meadow ; grazing-land for horses and cattle ; food for cattle.

Patache [Fr.], a light vessel ; a stage-coach.

Patch, a piece sewed on to repair a hole. — A small parcel, as of land.

Fig. 389. — PATCHOULI.

Patchouli, an Indian herb, the *Pogostemon patchouli* (Fig. 389) ; the dried tops, with the leaves and flowers, are imported to distil an essential oil from, which is esteemed by some as a perfume.

Patchwork, a union of pieces of different kinds or colors ; patchwork quilts and table-covers were formerly in estimation, as displaying the economy and taste in arrangement of the pieces by the good housewife.

Pâté de Foie Gras [Fr.], a pie or patty made of the liver of the goose, and for which Strasburg (Alsace) and Toulouse (France) are famous among gourmands. To produce this dainty, the poor young bird is confined in autumn in a close cage, where, after having been fed for some time with beans or maize, parboiled maize seasoned with salt is forced three times a day down its throat for about one month, that is to say, till its liver has swelled to a weight of from one to three pounds. This diseased liver is seasoned, spiced, truffled, and then baked in a thick crust, or in a tureen, for exportation. The town of Nérac, in France, is also celebrated for its pâtés, which are made in the same way, of the liver of the musk duck.

Paten, the plate which holds the wafer of consecrated bread of the communion service.

Patent, a privilege from the State granted by letters-patent (whence the name), conveying to

the individual or individuals specified therein the sole right to make, use, or dispose of some new invention or discovery, for a certain specified period, which in the U. States is limited to 17 years. The average annual number of applications for American patents is about 20,000. In 1878 the business of the U. States *P.* office, which is a bureau of the Interior Department, comprised: patents issued, 12,345; reissues, 509; designs, 590; labels, 492. The number of applications for *P.*, including designs, for the year, was 20,260; the number of applications for reissues was 638; caveats, 2,755; labels, 700. There were 832 cases forfeited for want of the final fee. The total receipts of the *P.* Office for the year amounted to $725,375.55, and the total expenditures, $566,-916.39, leaving a balance of $158,459.16, which, added to the amount in the Treasury at the close of the previous year, leaves the large sum, $1,272,680.-56, in the Treasury to the credit of the *P.* Office.— The following information and regulations, designed to be in strict accordance with the revised, consolidated, and amended law of the U. States relating to *P.* for inventions and designs, are the copy in full of the *Rules of Practice* published in August, 1877, by the U. States *P.* Office. Following these regulations will be found copious forms, to which inventors and attorneys are recommended to conform as nearly as possible.

Who may obtain a Patent — 1. Any person, whether citizen or alien, being the original and first inventor or discoverer of any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent for his invention or discovery, subject to the conditions hereinafter named. — 2. In case of the death of the inventor, the patent may be applied for by, and will issue to, his executor or administrator. In case of an assignment of the whole interest in the invention, or of the whole interest in the patent if granted, the patent will issue to the assignee, upon the request of the latter, or his assignor; and so, if the assignee holds an undivided part interest, the patent will, upon a similar request, issue jointly to him and the inventor; but the assignment must first have been entered of record, and at a day not later than the date of the payment of the final fee. The application and oath must be made by the actual inventor, if alive, even if the patent is to issue to an assignee; but where the inventor is dead, the application and oath must be made by his executor or administrator. — 3. Joint inventors are entitled to a joint patent; neither can claim one separately; but the independent inventors of separate and independent improvements in the same machine cannot obtain a joint patent for their separate inventions, nor does the fact that one man furnishes the capital and the other makes the invention, entitle them to make application as joint inventors. — 4. A patent will not be granted to an applicant if what he claims as new has been, before his invention, patented or described in any printed publication in this or any foreign country, or been invented or discovered in this country, nor if he has once abandoned his invention, nor if it has been in public use or on sale more than two years previous to his application. — 5. If it appears that the inventor, at the time of making his application, believes himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, it not appearing that the same, or any substantial part thereof, had before been patented or described in any printed publication. — 6. Merely conceiving the idea of an improvement or machine is not an "invention" or "discovery." The invention must have been reduced to a practical form, either by the construction of the machine itself, or by such disclosure of its exact character that a mechanic, or one skilled in the art to which it relates, can and does construct the improvement, before it will prevent a subsequent inventor from obtaining a patent.

Mode of proceeding to obtain a Patent. — Application. — 7. No application for a patent will be regarded as completed or be placed upon the files for examination until the fee is paid, the specification, the petition, and the oath, properly signed, are filed, and the drawings and a model or specimens (when required) are furnished. The application must be completed and prepared for examination within two years after the filing of the petition; and in default thereof, or upon failure of the applicant to prosecute the same within two years after any action thereon, of which notice shall have been mailed to him or his agent, it shall be regarded as abandoned, unless it be shown, to the satisfaction of the Commissioner, that such delay was unavoidable. — It is desirable that everything necessary to make the application complete should be deposited in the office at the same time. If otherwise, a letter should accompany each part, stating to what application it belongs, and giving the date thereof. — 8. During the pendency of an application, either the drawing or model (but not both at the same time) may be withdrawn for correction, but the specification will not be permitted to be withdrawn for any purpose whatever. — 9. The application must be in writing, in the English language, and addressed to the Commissioner of Patents. The petition and specification must be separately signed by the applicant. The specification, claims, and all amendments must be written in a fair, legible hand; otherwise the office may require them to be printed; and all interlineations or erasures should be clearly marked in a marginal or foot note written on the same sheet of paper. Legal-cap paper is deemed preferable, and a wide margin should always be left upon the left-hand side of the page, both of the specification and amendments. All the papers constituting the application should be attached together. — 10. The applicant, if the inventor, must make oath or affirmation that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent; that he does not know and does not believe that the same was ever before known or used; and shall state of what country he is a citizen, and of what a resident. If the application be made by an executor or administrator, the form of the oath will be correspondingly changed. The oath or affirmation may be made before any person within the U. States, authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, chargé d'affaires, consul, or commercial agent holding commission under the Government of the U. States, or before any notary-public of the foreign country in which the applicant may be, the oath being attested in all cases, in this and other countries, by the proper official seal of such notary. — 11. In case the applicant by amendment seeks to introduce any claim or claims, not substantially embraced in the original affidavit, he will be required to file a supplemental oath relative to the invention as covered by such new or enlarged claim or claims; and such supplemental oath must be upon the same paper which contains the proposed amendment.

Specification. — 12. The specification is a written description of the invention or discovery, and of the manner and process of making, constructing, compounding, and using the same, and is required to be in such full, clear, concise, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same. It must be followed by a specific and well-defined claim of the part, improvement, or combination which the applicant regards as his invention or discovery. — 13. Where there are drawings, the specification should refer by letters and figures to the different parts; and it must set forth the precise invention for which a patent is claimed, explaining the principle thereof, and the best mode in which the applicant has contemplated applying that principle, so as to distinguish it from other inventions. — 14. In all applications for patents upon mere improvements, the specification must particularly point out the part or parts to which the improvement relates, and must by explicit language distinguish between what is old and what is claimed as the improvement, so that the office and the public may understand exactly for what the patent is granted; and in such cases the description and the drawings, as well as the claims, should be confined to the specific improvement and such parts as necessarily co-operate with it. — 15. Two or more separate and independent inventions cannot be claimed in one application; but where several distinct inventions are dependent upon each other and mutually contribute to produce the new result, they may be so claimed. — 16. If more than one invention is claimed in a single application, and they are found to be of such a nature that a single patent may not be issued to cover the whole, the office will require the inventor to confine the description and claim of the pending application to whichever invention he may elect; the other inventions may be made the subject of separate applications. The same prerequisites as to form are necessary in such applications as in original ones. — 17. The specification must be signed by the inventor, or by his executor or administrator, and must be attested by two witnesses. Full names must be given, *and all names, whether of applicants or witnesses, must be legibly written.*

Drawings. — 18. The applicant for a patent is required by law to furnish a drawing of his invention, where the nature of the case admits of it. — 19. Three several editions of patent drawings are printed and published: one for office use, certified copies, etc., of the size and character of those attached to patents, the work being about 6 by 9½ inches; one reduced to half that scale, or one fourth the surface, of which four will be printed on a page to illustrate the volumes distributed to the courts, etc.; and one reduction — to about the same scale — of a selected portion of each drawing, to illustrate the Official Gazette. — This work will all be done by the photolithographic or other analogous process, and therefore the character of each

original drawing must be brought as nearly as possible to a uniform standard of excellence, suited to the requirements of the process, and calculated to give the best results, in the interests of inventors, of the office, and of the public generally. The following rules will therefore be rigidly enforced, and any departure from them will be certain to cause delay in the examination of an application for letters-patent: (*a.*) Drawings should be made upon paper stiff enough to stand in the portfolios, the surface of which must be calendered and smooth. Owen Company's three-sheet bristol-board, used by the Patent Office, is recommended. Indian ink of good quality, to the exclusion of all other kinds of ink or color, must be employed, to secure perfectly black and solid work. (*b.*) The size of a sheet on which a drawing is made should be exactly 10 by 15 inches. One inch from its edges a single marginal line is to be drawn, leaving the "sight" precisely 8 by 13 inches. Within this margin all work and signatures must be included. One of the smaller sides of the sheet is regarded as its top, and, measuring downward from the marginal line, a space of not less than 1¼ inches is to be left blank for the insertion of title, name, number, and date. (*c.*) All drawings must be made with the pen only, using the blackest Indian ink. Every line and letter (signatures included) must be *absolutely black.* This direction applies to all lines, however fine, to shading, and to lines representing cut surfaces in sectional views. All lines must be clean, sharp, and solid, and they must not be too fine or crowded. Surface shading, when used, should be left very open. Sectional shading should be by oblique parallel lines, which may be about one twentieth of an inch apart. (*d.*) Drawings should be made with the fewest lines possible consistent with clearness. By observing this rule the effectiveness of the work after reduction will be much increased. Shading (except on sectional views) should be used only on convex and concave surfaces, where it should be used sparingly, and may even there be dispensed with if the drawing is otherwise well executed. The plane upon which a sectional view is taken should be indicated on the general view by a broken or dotted line. Heavy lines on the shade sides of objects should be used, except where they tend to thicken the work and obscure letters of reference. The light is always supposed to come from the upper left-hand corner, at an angle of forty-five degrees. Imitations of wood or surface-graining should not be attempted. (*e.*) The scale to which a drawing is made ought to be large enough to show the mechanism without crowding, and two or more sheets should be used if one does not give sufficient room to accomplish this end; but the number of sheets must never be increased unless it is absolutely necessary. It often happens that an invention, although constituting but a small part of a machine, has yet to be represented in connection with other and much larger parts. In such cases a general view on a small scale is recommended, with one or more of the invention itself on a much larger scale. (*f.*) Letters of reference must be well and carefully formed; they are of the first importance. When at all possible, no letter of reference should measure less than one eighth of an inch in height, that it may bear reduction to one twenty-fourth of an inch, and they may be much larger when there is sufficient room. Reference letters must be so placed in the close and complex parts of drawings as not to interfere with a thorough comprehension of the same, and to this end should rarely cross or mingle with the lines. When necessarily grouped around a certain part, they should be placed at a little distance, where there is available space, and connected by short broken lines with the parts to which they refer. They must never appear upon shaded surfaces, and, when it is difficult to avoid this, a blank space must be left in the shading where the letter occurs, so that it shall appear perfectly distinct and separate from the work. If the same part of an invention appears in more than one figure, it should always be represented by the same letter. (*g.*) The signature of the inventor is to be placed at the lower right-hand corner of the sheet, and the signatures of the witnesses at the lower left-hand corner, all within the marginal line. The title should be written with pencil on the back of the sheet. The permanent names and title will be supplied subsequently by the office in uniform style. When figures are larger than the width of the sheet, the latter is turned on its side, and the space for heading will be left at the right, and that for the signatures at the left, occupying the same space and position as in the upright subjects, so that the heading and names will read right when the drawing is held in an upright position. (*h.*) As a rule, one view only of each invention can be shown in the Gazette illustrations. The selection of that portion of a drawing best calculated to explain the nature of the specific improvement would be facilitated, and the final result improved, by the judicious execution of a figure with express reference to the Gazette, but which might, at the same time, act as one of the figures referred to in the specification. For this purpose, the figure may be a plan, elevation, section, or perspective view, according to the judgment of the draughtsman. It must not cover a space exceeding sixteen square inches. All its parts should be especially open and distinct, with very little or no shading, and it must illustrate the invention claimed only, to the exclusion of all other details. When well executed, it will be used without curtailment or change; but any attempt at excessive fineness, crowding, or unnecessary elaborateness of detail, will insure its rejection for Gazette purposes. (*i.*) Drawings should be rolled for transmission to the office, not folded. No agent's or attorney's stamp, or advertisement, or any written address, will be permitted upon the face of a drawing within or without the marginal line. — 20. These rules do not always apply to drawings for designs and trade-marks. — 21. The foregoing rules relating to drawings will be rigidly enforced; and all drawings not artistically executed in conformity therewith will be returned to the respective applicants, or, at the applicant's option and cost, the office will make the necessary corrections. — 22. All reissue applications must be accompanied by new drawings, as in original applications, and the inventor's name must appear in all cases upon the same. — 23. Applicants are advised to employ competent artists to make their drawings, or, if desired, the office will furnish the drawings on payment of the cost of making the same.

Models. — 24. In all cases which admit of representation by model, the applicant, if required, shall furnish a model to exhibit advantageously the several parts of his invention or discovery. As a rule, a model will not be dispensed with except by recommendation of the examiner. The model must clearly exhibit every feature of the machine which forms the subject of a claim of invention, but should not include other matter than that covered by the actual invention or improvement, unless it is necessary to the exhibition of a working model. — 25. The model must be neatly and substantially made of durable material, metal being deemed preferable; and should not in any case be more than one foot in length, width, or height. If made of pine or other soft wood, it should be painted, stained, or varnished. Glue must not be used, but the parts should be so connected as to resist the action of heat or moisture. Where practicable, to prevent loss, the model or specimen should have the name of the inventor permanently fixed thereon. In cases where models are not made strong and substantial, as here directed, the application will not be considered until a proper model is furnished. — 26. A working model is always desirable, in order to enable the office fully and readily to understand the precise operation of the machine. — 27. The model, unless it is deemed necessary that it be preserved in the office, or unless it be otherwise disposed of, may be returned to the applicant upon demand, and at his expense, in all cases where an application has been rejected more than two years; and the model, in any pending case of less than two years' standing, may be returned to the applicant upon the filing of a formal abandonment of the application, signed by applicant in person. Models belonging to patented cases will not be allowed to be taken from the office except by some employé thereof, when authorized by the Commissioner, and in whose custody it will remain until returned. — 28. Models filed as exhibits, in interference and other cases, may be returned to the applicant, or otherwise disposed of at the discretion of the Commissioner. Models in patented cases will, when necessary, be repaired by the office at the cost of the proper owner, on request by such owner. When the invention or discovery is a composition of matter, the applicant, if required by the Commissioner, shall furnish specimens of ingredients, and of the composition, sufficient in quantity for the purpose of experiment. In all cases where the production is not perishable, a specimen put up in form, so as to be preserved by the office, should be filed. Ordinary, well-known ingredients need not be furnished, unless the office disputes their operation in the manner as stated by applicant.

The Examination. — 29. All cases in the Patent Office are classified and taken up for examination in regular order; those in the same class being examined and disposed of, as far as practicable, in the order in which the respective applications are completed. When, however, the invention is deemed of peculiar importance to some branch of the public service, and when, for that reason, the head of some Department of the Government specially requests immediate action, the case will be taken up out of its order. These, with applications for extensions, for reissue, for letters-patent for inventions for which a foreign patent has already been obtained, and for designs, which cases have precedence over all others, are the only exceptions to the above rule in relation to the order of examination. If an application is found to conflict with a caveat, its examination will be suspended as hereinafter provided. The first step in the examination of any application will be to determine whether it is, in all respects, in proper form. If, however, an objection as to form is not vital, the examiner may proceed to the consideration of the application on its merits; but in such case he must, in his first letter to applicant, state all his objections, whether formal or otherwise. — 30. The personal attendance of the applicant at the Patent Office is unnecessary. The business can be done by correspondence or by attorney; and if there has been an assignment of the whole or of an undivided part of the invention, the assignee, or, in the latter case, the assignee and the inventor jointly, will be recognized as the proper party to prosecute the application. — 31. The applicant has a right to amend after the first rejection; and he may amend as often as the examiner presents any new references. After a second rejection, and at any time before the issue of a patent, special amendments may be received for examination by the approval of the Com-

missioner. But such amendments must first be submitted to the tribunal last acting on the case, for recommendation or objection, and will be subject to revision and restriction the same as original amendments. Affidavits in support of applications will not be received at any stage of the examination, unless the office denies that the invention is operative or useful. — 32. All amendments of the model, drawings, or specification, in the case of original applications which are capable of illustration by drawing or model, must conform to at least one of them as they were at the time of the filing of the application; further changes than this, involving a departure from the original invention, can only be made by filing a new application. If the invention does not admit of illustration by drawing, amendment of the specification may be made upon proof satisfactory to the Commissioner that the proposed amendment is a part of the original invention. All amendments of specifications or claims must be made on separate sheets of paper from the original, and must be filed in the manner above directed. Even when the amendment consists in striking out a portion of the specification or other paper, the same course should be observed. No erasure must be made by the applicant. In every case of amendment the exact word or words to be stricken out or inserted should be clearly specified, and the precise point indicated where the erasure or insertion is to be made. — 33. Whenever, on examination, any claim for a patent is rejected for any reason whatever, the applicant will be notified thereof, and the reasons for such rejection will be given, together with such information and references as may be useful in judging of the propriety of prosecuting his application or of altering his specification; and if, after receiving such notice, he shall persist in his claim for a patent, with or without altering his specification, the case will be re-examined. — 34. Upon the rejection of an application for want of novelty, the examiner must cite the best references at his command, and the applicant will, if he demands it, be entitled to a specific reference (by name, date, and class, or the equivalent thereof) to the article or articles by which it is anticipated. If he desires a copy of the cases so referred to, or of the plates or drawings connected with them, they will be forwarded to him if in the possession of the office, on payment of the cost of making such copies. — 35. Pending applications must not be cited as references, except for the purposes of an interference. — 36. The specification, especially if the claim be amended, must be amended and revised, when required, for the purpose of correcting inaccuracies of description or unnecessary prolixity, and of securing correspondence between the statement and description of the invention and the claim. Mere errors of orthography or of grammatical construction may be corrected by the examiner in charge. — 37. The office will not return specifications for amendment. If applicants have not preserved copies of such papers as they wish to amend, the office will furnish them on the usual terms.

Date of Patent. — 38. Every patent will bear date as of a day not later than six months from the time at which the application was passed and allowed and notice thereof was mailed to the applicant or his agent, and if the final fee (or, in case the fee has been paid to the Treasurer or any of the assistant treasurers, or any of the designated depositaries of the U. States, the certificate of deposit) be not received at the office within that period, the patent will be withheld. The party may, however, obtain a patent upon a new application, as hereinafter provided. A patent will not be antedated.

Abandoned Applications. — 39. When an application for a patent has been rejected and the applicant fails to renew the same, or to file a new one within two years after the date when notice of the last official action was mailed to him or to his agent, his application will be held to have been abandoned. Any act which calls such rejected application up for further consideration, within the time mentioned, will be regarded as constituting a renewal. — 40. When a new application is filed in place of an old one, a new specification, oath, drawing, and fee will be required, but the old model, if suitable, may be used. — 41. Upon the hearing of applications attempted to be renewed after the expiration of the two years after any action thereon, it must be shown to the satisfaction of the Commissioner that such delay was unavoidable. In those cases above mentioned where the patent has been withheld by reason of non-payment of the final fee, any person, whether inventor or assignee, who has an interest in the invention for which such patent was ordered to issue, may renew the former application by filing a second one for the same invention; but such second application must be made within two years after the allowance of the original one. Upon the hearing of the renewed applications abandonment shall be considered as a question of fact.

Appeals. — 42. Every applicant for a patent or the reissue of a patent, any of the claims of which have twice been rejected upon the merits of the invention, may appeal from the decision of the primary examiner in such case to the board of examiners-in-chief, having once paid a fee of ten dollars. For this purpose a petition in writing must be filed, signed by the party, or his authorized agent or attorney, praying an appeal, and setting forth the reasons upon which the appeal is taken. This statement of the reasons of appeal should point out distinctly and specifically the supposed errors of the examiner's action, and should constitute a brief of the argument upon which the applicant will rely in support of his appeal. The mere allegation that the examiner has erred will not be received as a proper reason for appeal. Before the appeal is entertained by the board, this statement will be submitted to the primary examiner, who will make answer in writing touching all the points involved therein. Both the reasons of appeal and the examiner's answer should set forth the invention, the claims rejected, the references cited, and other objections going to the merits of the case generally. It will not be a sufficient compliance with this rule to refer to letters as containing the examiner's answer and references. If the appellant desires to be heard orally before the board, he should so indicate when he files his appeal; a day of hearing will then be fixed, and due notice of the same be given him. In contested cases the appellant shall have the right to make the opening and closing arguments. — 43 The examiners-in-chief will consider the case as it was when last passed upon by the primary examiner, merely revising his decisions so far as they were adverse to the appellant. If, however, they discover any reason not given by the examiner why a patent should not issue, they should make a statement to that effect to the Commissioner. If affidavits are received under Rule 31, after the case has been appealed, the application will be remanded to the examiner for reconsideration. — 44. There must be two rejections upon the claims as originally filed, or, if amended in a matter of substance, upon the amended claims; and all the claims must be passed upon and all preliminary and intermediate questions relating to matters not affecting the merits of the invention must be settled before the case is appealed to the board. All cases must be thoroughly examined and all references exhausted before final rejection. Decisions of examiners upon preliminary or intermediate questions, or refusals to act, once repeated, will be re-examined by the Commissioner in person, upon written application setting forth the grounds of the appeal, and answer thereto by the examiner as in other appeals. For appeals of this class no fee is required. — 45. Cases which have been heard and decided on appeal will not be reopened by the examiner without the written authority of the Commissioner; and cases which have been decided by the examiners-in-chief will not be reheard by them, when no longer pending before them, except upon the same authority. Cases will be regarded as pending before a tribunal until appeal has been taken from its decision, or until the limit of appeal has expired. Cases which have been deliberately decided by one Commissioner will not be reconsidered by his successor upon the same state of facts. They may, however, be reopened in accordance with the general principles which govern the granting of new trials. — 46. All cases which have been acted on by the board of examiners-in-chief may be brought before the Commissioner in person, upon a written request to that effect, and upon the payment of the fee of twenty dollars required by law. — 47. From the adverse decision of the Commissioner upon the claims of an application, an appeal may be taken to the Supreme Court of the District of Columbia, sitting *in banc*. In taking such appeals the applicant is required, under the rules of the court, to pay to the clerk of the court a docket fee of $10, and he is also required by law to lay before the court certified copies of all the original papers and evidence in the case. The petition should be filed and the fee paid at least ten days before the commencement of the term of court at which the appeal is to be heard. Immediately upon taking an appeal the appellant must give notice thereof to the Commissioner of Patents, and file in the Patent Office his reasons of appeal, specifically set forth in writing. The docket for the trial of cases appealed from the decision of the Commissioner of Patents will be called on the first day of each session of the supreme court of the District of Columbia in general term. These sessions are held three in each year, and begin respectively on the first Monday in January, the third Monday in April, and the fourth Monday in September. — 48. In cases of interference parties have the same remedy by appeal to the examiners-in-chief, and to the Commissioner, as in *ex-parte* cases; but no appeal lies in such cases from the decision of the Commissioner. Appeals in interference cases should be accompanied with a brief statement of the reasons therefor, and both parties will be required to file briefs of their arguments at least five days before the day of hearing. Printed briefs are in all cases preferred.

Hearings. — 49. All cases pending before the Commissioner, the board of examiners-in-chief, or the examiner in charge of interferences, will stand for argument at 1 o'clock on the day of hearing, unless some other hour be specially designated. If either party in a contested case, or the appellant in an *ex-parte* case, appears at that time, he will be heard, but a contested case will not be taken up for oral argument after the day of hearing, except by consent of both parties. If the engagements of the tribunal before whom the case is pending are such as to prevent it from being taken up on the day of hearing, a new assignment will be made, or the case will be continued from day to day until heard. Unless otherwise ordered before the hearing begins, oral arguments will be limited to one hour for each counsel. After any case has been argued, nothing further relating thereto will be heard unless requested by the tribunal having the decision of the case; and all inter-

views for this purpose, with parties in interest or their attorneys, will be invariably denied.

Motions. — 50. In contested cases reasonable notice of all motions, and copies of the motion, papers, and affidavits, must be served upon the opposite party or his attorney. Proof of such service must be made before the motion will be entertained by the office; and motions will not be heard in the absence of either party except upon default after due notice. Motions will be heard in the first instance by the officer or tribunal before whom the particular case may be pending; but an appeal from the decision rendered may be taken to the Commissioner in person.

Interferences. — 51. An "interference" is a proceeding instituted for the purpose of determining the question of *priority of invention* between two or more parties claiming the same patentable subject-matter. Before the declaration of an interference it is desirable that all preliminary questions shall be settled by the primary examiner, and the issue must be clearly defined; the invention which is to form the subject of the controversy must be decided to be patentable, and the claims of the respective parties should be put in such condition that they will not require alteration after the interference has been finally decided, unless the testimony adduced upon the trial should necessitate such change. Where a party who is required to put his case in proper shape for the purposes of an interference delays doing so beyond a reasonable time specified, the interference will at once proceed. After final judgment of priority the application of such party will be held for revision and restriction, subject to interferences with other applications or new references. An interference will be declared in the following cases: *First.* When two or more parties have applications pending before the office at the same time, and their respective claims conflict in whole or in part. *Second.* When two or more applications are pending at the same time, in each of which a like patentable invention is shown or described, and claimed in one though not specifically claimed in all of them. *Third.* When an applicant, having been rejected upon any unexpired patent, claims to have made the invention before the patentee. Where a preliminary interference is declared on matter shown but not claimed in the application last filed, the applicant must, in order to avoid the continuance of the interference, disclaim the invention of the particular matter so shown. — 52. The fact that one of the parties has already obtained a patent will not prevent an interference; for, although the Commissioner has no power to cancel a patent already issued, he may, if he finds that another person was the prior inventor, give him a patent also, and thus place both parties on an equal footing before the courts and the public. When a patent is involved in an interference the assignees, as well as the inventor, will be notified. — 53. Before the declaration of an interference proper a preliminary interference will be declared, in which the primary examiner will briefly and concisely define the interfering subject-matter, and specify the claims embracing the same, and also notify the respective parties when the applications of the other parties were filed, together with their names and residences. Each party to the interference will be required to file a brief statement under oath, showing the date of the original conception, the date that the invention was reduced to drawings or model, the date of its completion, and the extent of use. The parties will be strictly held in their proof to the dates set up in their preliminary statements. This statement must be sealed up before filing (to be opened only by the examiner of interferences), and the name of the party filing it and the subject of the invention indicated on the envelope. These statements shall not be open to the inspection of the opposing parties until the testimony has been taken and filed in the office, or until the interference has been decided. At the time of the examination of the preliminary statements the examiner of interferences will also make an examination of the preliminary declaration (instituted by the primary examiner), in order to ascertain whether or not the issue between the parties has been clearly defined. If it be found, upon such examination, that the preliminary declaration is ambiguous in this particular, the interference will be suspended and the case returned to the primary examiner for amendment. If the party upon whom rests the burden of proof fails to file a preliminary statement, or if his statement fails to overcome the *prima-facie* case made by the respective dates of application, the other party will be entitled to an immediate adjudication of the case upon the record. If the earlier applicant fails to file a preliminary statement, no testimony will subsequently be received from him going to prove that he made the invention at a date prior to his application. The preliminary statement can in no case be used as evidence in behalf of the party making it. Its use is to determine whether the interference shall be proceeded with, and to serve as a basis of cross-examination for the other party. If either party requires a postponement of the time for filing the preliminary statements, he must present his reasons therefor, in the form of an affidavit, prior to the day previously fixed upon. In case of material error in the preliminary statement, arising through inadvertence or mistake, it may be corrected, upon showing to the satisfaction of the Commissioner that its correction is essential to the ends of justice. The motion to correct the said statement must be made before the taking of the testimony relating to the alleged error, and as soon as practicable after the discovery thereof; and it must be accompanied by notice to the adverse party or parties. — 54. Where no testimony is taken by the applicant upon whom rests the burden of proof, or where testimony has been taken by such applicant, but not by the other party during the time assigned to the latter, the case will be considered closed; upon motion duly made at the expiration of the time assigned to such parties, respectively, the case may be set for hearing at any time not less than ten days thereafter. — 55. In cases of interference appeals may be taken to the examiners-in-chief and to the Commissioner, in the manner provided in Rule 48. — 56. When an interference is declared, notice will be given to both parties or to their attorneys; or, in case the application or patent in interference has been assigned, then notices will be sent to the assignees. When one of the parties has received a patent, duplicate notices will be sent to the patentee and to his attorney of record. Where one of the parties resides abroad and has no known agent in the U. States, in addition to the notice sent by mail, notice may be given by publication in the Official Gazette. — 57. In cases of interference the party who first filed so much of his application for a patent as is required by Rule 7 will be deemed the first inventor in the absence of all proof to the contrary. A time will be assigned in which the other party shall complete his direct testimony, and a further time in which the adverse party shall complete the testimony on his side; and a further time in which the party who first took testimony may take rebutting testimony, but shall take no other. If there are more than two parties, the times for taking testimony will be so arranged that each shall have a like opportunity in his turn, each being held to go forward and prove his case against those who filed their application before him. — 58. If it becomes necessary for either party to have the time for taking his testimony, or for the hearing, postponed, he must make application for such postponement, and must show sufficient reason for it by affidavit, as provided in Rule 113, filed before the time previously appointed has elapsed, if practicable, and must also furnish his opponent with copies of his affidavits and with reasonable notice of the time of hearing his motion. — 59. After the declaration of the interference and before the time for filing the preliminary statements has expired, motions to dissolve the same on the grounds of lack of novelty, or that no interference in fact exists, or that there has been such other irregularity in declaring the same as will preclude the proper determination of the question of right between the parties, must be made before the examiner by whom the interference was instituted. After the declaration of interference such motion must be made before the tribunal having jurisdiction at the time Appeal may be taken to the Commissioner in person; but if the examiner should decide that the subject-matter is not patentable in view of the state of the art, the interference will be dissolved, and the matter decided upon can be proceeded with *ex-parte.* After the declaration of the interference proper, it will not be determined without judgment of priority, founded upon the testimony or the written concession of one of the parties. In their decision of the question of priority, or before such decision, the examiner of interferences, or the examiners-in-chief, as the case may be, will direct the attention of the Commissioner to any fact not relating to priority which may have come to their attention (by motion or otherwise), and which, in their opinion, amounts to a statutory bar to the grant of a patent to either or both parties. After final judgment the primary examiner will consider and determine any such matter not previously disposed of by the Commissioner. If at any time during the continuance of an interference the primary examiner discovers new references, he may request a suspension of the interference for their consideration; but after testimony has been taken new parties will not be admitted into the interference. Where final judgment of priority has been rendered in favor of an applicant whose application has passed to issue, the final fee been paid, and nothing more remains to be done but to issue the patent, the patent will not be withheld for the purpose of putting such application in interference with any application filed subsequent to the rendition of such judgment and the payment of such final fee; but a new interference may be declared with the patent. If judgment be based upon a concession of priority by either of the parties, such concession must be in writing, and under the signature of the inventor himself; and if there has been an assignment, the assignee must join in the concession. — 60. No amendments to the specification will be received during the pendency of an interference, except as provided in Section 61. A second interference will not be declared upon a new application on the same invention filed by either party during the pendency of an interference, or after judgment, nor a rehearing be granted, unless it be shown to the satisfaction of the Commissioner that the party desiring a new interference or rehearing has new and material testimony which he could not have procured in time for the hearing, or unless other sufficient reasons be shown — 61. When an application is adjudged to interfere with a part only of another pending application, the interfering parties will be permitted to see or obtain copies of so much only of the specifications as refers to the interfering claims And either party may, if he so elect, withdraw from his application the

claims adjudged not to interfere, and file a new application therefor: *Provided*, That the claims so withdrawn cover inventions which do not involve the devices in interference: *And provided also*, That the devices in interference are eliminated from the new application. In such case the latter will be examined without reference to the interference from which it was withdrawn.

Reissues. — 62. A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest, when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. In the cases of patents issued and assigned prior to July 8, 1870, the application for reissue may be made by the assignee; but, in the case of patents issued or assigned since that date, the application must be made and the specification sworn to by the inventor, if he be living. — 63. The petition for a reissue must be accompanied with a certified copy of the abstract of title, giving the names of all assignees owning any undivided interest in the patent; and in case the application is made by the inventor, it must be accompanied with the written assent of such assignees. — 64. The general rule is, that whatever is really embraced in the original invention, and so described or shown that it might have been embraced in the original patent, may be the subject of a reissue; but no new matter shall be introduced into the specification, nor shall the model or drawings be amended except each by the other; but, when there is neither model nor drawing, amendments may be made upon proof satisfactory to the Commissioner that such new matter or amendment was a part of the original invention, and was omitted from the specification by inadvertence, accident, or mistake, as aforesaid. — 65. Reissued patents expire at the end of the term for which the original patents were granted. For this reason applications for reissue will take precedence, in examination, of original applications. — 66. A patentee in reissuing may, at his option, have a separate patent for each distinct and separate part of the invention comprehended in his original patent, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications. Each division of a reissue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts. All the divisions of a reissue will issue simultaneously. If there be controversy as to one, the others will be withheld from issue until the controversy is ended. — 67. In all cases of applications for reissues, the original claim, if reproduced in the amended specification, is subject to re-examination, and may be revised and restricted in the same manner as in original applications. The application for a reissue must be accompanied by a surrender of the original patent, or, if lost, then by an affidavit to that effect and a certified copy of the patent; but if any reissue be refused, the original patent will, upon request, be returned to the applicant. Where more than one patent to the same person shows or describes a device but does not claim it, a reissue to cover it must be of the patent first granted.

Disclaimers. — 68. Whenever, by inadvertence, accident, or mistake, the claim of invention in any patent is too broad, embracing more than that of which the patentee was the original or first inventor, some material or substantial part of the thing patented being truly and justly his own, the patentee, his heirs or assigns, whether of a whole or of a sectional interest, may, upon payment of the duty required by law, make disclaimer of such parts of the thing patented as the disclaimant shall not choose to claim or to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, shall be recorded in the Patent Office, and shall thereafter be considered as part of the original specification, to the extent of the interest possessed by the claimant and by those claiming under him after the record thereof. — This class of disclaimers must be distinguished from those which are embodied in original or reissue applications referring to matter shown or described, but to which the disclaimant does not choose to claim title. These require no fee.

Extensions. — 69. No patent granted since March 2, 1861, can be extended except by act of Congress. — 70. When a patent has been so extended, subject to the further decision of the Commissioner, the subsequent proceedings will be conducted in accordance with the following rules: — 71. Any person may oppose an application for extension, but must give notice of such intention to the applicant or his attorney of record within the time hereafter named, and furnish him with a statement of his reasons of opposition. After this he will be regarded as a party in the case, and will be entitled to notice of the time and place of taking testimony, to a list of the names and residences of the witnesses whose testimony may have been taken previous to his service of notice of opposition, and to a copy of the application and of any other papers on file, upon paying the cost of copying. He must also immediately file a copy of such notice and reasons of opposition, with proof of service of the same, in the Patent Office. If the extension is opposed on the ground of lack of novelty in the invention, the reasons of opposition should contain a specific statement of any and all matter relied upon for this purpose. — 72. The applicant for an extension must furnish to the Office a statement in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures on account thereof, both in this and foreign countries. This statement must be made particular and in detail, unless sufficient reason is set forth why such a statement cannot be furnished. It must *in all cases* be filed with the petition. No exceptions will be made to this rule. Such statement must also be accompanied with a *certified abstract of title and* a declaration, under oath, setting forth the extent of applicant's interest in the extension sought. — 73. The questions which arise on each application for an extension are: *First.* Was the invention *new* and *useful* when patented? *Second.* Is it *valuable* and *important to the public*, and to what extent? *Third.* Has the inventor been *reasonably remunerated* for the time, ingenuity, and expense bestowed upon it, and the introduction of it into use? If not, has his failure to be so remunerated arisen from neglect or fault on his part? *Fourth.* What will be the effect of the proposed extension upon the public interests? No proof will be required from the applicant upon the first question unless the invention is assailed upon those points by opponents. To enable the Commissioner to come to a correct conclusion in regard to the second point of inquiry, the applicant must, if possible, procure the testimony of persons disinterested in the invention, which testimony should be taken under oath. *This testimony must distinguish carefully between the specific devices covered by the claims of the patent and the general machine in which those devices may be incorporated.* In regard to the third point of inquiry, in addition to his own oath, showing his receipts and expenditures on account of the invention, the applicant must show, by testimony under oath, that he has taken all reasonable measures to introduce his invention into general use; and that, without neglect or fault on his part, he has failed to obtain from the use and sale of the invention a reasonable remuneration for the time, ingenuity, and expense bestowed on the same, and the introduction of it into use. — 74. In case of opposition to the extension of a patent by any person, both parties may take testimony, each giving reasonable notice to the other of the time and place of taking said testimony, which shall be taken according to the rules hereinafter prescribed. — 75. Any person desiring to oppose an extension must serve his notice of opposition, and file his reasons therefor, at least ten days before the day fixed for the closing of testimony; but parties who have not entered formal opposition in time to put in testimony may, at the discretion of the Commissioner, be permitted to appear on the day of hearing, and make argument upon the record in opposition to the grant of the extension. But in such case good cause for the neglect to make formal opposition must be shown. — 76. In contested cases no testimony will be received, unless by consent, which has been taken within thirty days next after the filing of the petition for the extension. — 77. Service of notice to take testimony may be made upon applicant, upon the opponent, upon the attorney of record of either, or, if there be no attorney of record, upon any attorney or agent who takes part in the service of notice, or in the examination of the witnesses of either party. Where notice to take testimony has already been given to an opponent, and a new opponent subsequently gives notice of his intention to oppose, the examination need not be postponed, but notice thereof may be given to such subsequent opponent by mail or by telegraph. This rule, however, does not apply to *ex-parte* examinations, or those of which no notice has been given when notice of opposition is served. — 78. In the notice of the application for an extension a day will be fixed for the closing of testimony, and the day of hearing will also be named. Application for a postponement of the day of hearing, or for further time for taking testimony, must be made and supported according to the same rules as are to be observed in other contested cases; but they will not be granted in such a manner as to cause a risk of preventing a decision prior to the expiration of the patent. Immediately upon the closing of the testimony the application will be referred to the examiner in charge of the class to which the invention belongs for the report required by law; and said report shall be made not less than five days before the day of hearing. As this report is intended for the information of the Commissioner, neither the parties nor their attorneys will be permitted to make oral arguments before the examiner. In contested cases briefs are deemed desirable, and these should always be filed at least five days before the day of hearing.

Designs. — 79. A patent for a design may be granted to any person, whether citizen or alien, who, by his own industry, genius, efforts, and expense, has invented or produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woollen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any articles of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same

not having been known or used by others before his invention or production thereof, or patented or described in any printed publication, upon payment of the duty required by law, and other due proceedings had the same as in cases of inventions or discoveries. — 80. Patents for designs are granted for the term of three and one half years, or for seven years, or for fourteen years, as the applicant may, in his application, elect. — 81. The proceedings in applications for patents for designs are substantially the same as for other patents. The specification must distinctly point out the characteristic features of the design, and carefully distinguish between what is old and what is held to be new. The claims also should be as distinct and specific as in the case of patents for inventions or discoveries. — 82. When the design can be sufficiently represented by drawings or photographs a model will not be required. — 83. Whenever a photograph or an engraving is employed to illustrate the design, it must be mounted upon Bristol-board, ten by fifteen inches in size and properly signed and witnessed; the applicant will be required to furnish ten extra copies of such photograph or engraving (not mounted), of a size not exceeding seven and a half inches by eleven. Negatives are not required. Whenever the design is represented by a drawing made to conform to the rules laid down for drawings of mechanical inventions, but one copy need be furnished. Additional copies will be supplied by the photolithographic process, at the expense of the Patent Office.

Trade-Marks — See TRADE-MARK.

Foreign Patents. — 89. The taking out of a patent in a foreign country does not prejudice a patent previously obtained here; nor does it prevent obtaining a patent here subsequently, unless the invention shall have been introduced into public use in the U. States for more than two years prior to the application; but when a patent is taken out in this country for an invention previously patented abroad, the American patent will expire at the same time with the foreign patent, or if there be more than one, at the same time with the one having the shortest term; but in no case shall it be in force more than seventeen years. — 90. When application is made for a patent for an invention which has been already patented abroad, the inventor will be required to make oath that, according to the best of his knowledge and belief, the same has not been in public use in the U. States for more than two years prior to the application in this country. — 91. An applicant whose invention has been patented abroad should state the fact that a foreign patent has actually been obtained, giving its date, and if there be more than one, the date of each.

Caveats. See CAVEAT.

Assignments. — 98. A patent or trade-mark may be assigned, either as to the whole interest or any undivided part thereof, by an instrument of writing. No particular form of words is necessary to constitute a valid assignment, nor need the instrument necessarily be sealed, witnessed, or acknowledged. — 99. Letters, copies of assignments, or *ex-parte* statements in relation to assignments are not proper matters for record. — 100. In every case where it is desired that the patent shall issue to an assignee, the assignment must be recorded in the Patent Office at a date not later than the day on which the final fee is paid — 101. When the patent is to issue in the name of the assignee, the entire correspondence will be with him or his authorized agent. — 102. A patentee may not only assign the whole or an undivided interest in his patent, but he may grant and convey an exclusive right under his patent to the whole or any specified portion of the U. States by an instrument in writing. — 103. Every assignment or grant of an exclusive territorial right, as well as of an interest in a patent or trade-mark, must be recorded in the Patent Office; if a patent, within three months, if a trade-mark, within sixty days, from the execution thereof; otherwise it will be void as against any subsequent purchaser or mortgagee for a valuable consideration without notice. — 104. The patentee may convey separate rights under his patent to make or to use or to sell his invention, or he may convey territorial or shop rights which are not exclusive. Such conveyances are mere licenses, and need not be recorded. — 105. The receipt of assignments is not generally acknowledged by the office; they will be recorded in their turn within a few days after their reception, and then transmitted to the person entitled to them.

Office Fees, and how payable. — 106. Nearly all the fees payable to the Patent Office are positively required by law to be paid in advance; that is, upon making application for any action by the office for which a fee is payable. For the sake of uniformity and convenience, the remaining fees will be required to be paid in the same manner. — 107. The following is the tariff of fees established by law: —

On filing every application for a design patent for three years and six months	$10.00
On filing every application for a design patent for seven years	15.00
On filing every application for a design patent for fourteen years	30.00
On filing every caveat	10.00
On filing every application for a patent for an invention or discovery	15.00
On issuing each original patent for an invention or discovery	20.00
On filing a disclaimer	10.00
On filing every application for a reissue	30.00
On filing every application for a division of a reissue	30.00
On filing every application for an extension	50.00
On the grant of every extension	50.00
On filing the first appeal from a primary examiner to examiners-in-chief	10.00
On filing an appeal to the Commissioner from examiners-in-chief	20.00
On depositing a label for registration	6.00
For every certified copy of a patent or other instrument, for every 100 words	.10
For certified copies of drawings, the reasonable cost of making them.	
For recording every assignment of 300 words or under	1.00
For recording every assignment, if over 300 and not over 1,000 words	2.00
For recording every assignment, if over 1,000 words	3.00
For uncertified copies of the specifications and accompanying drawings of all patents which are in print:	
Single copies	.25
Twenty copies or more, whether of one or several patents, per copy	.10
For uncertified copies of the specifications and drawings of patents not in print, the reasonable cost of making the same.	

In ordering copies of any drawing or specification, the name of the inventor and patentee, the title of the invention, and the date of the patent must be given. So, in ordering a copy of an assignment, the liber and page of the record, as well as the name of the inventor, must be given; otherwise an extra charge will be made for the time consumed in making any search that may become necessary — 108. No person will be allowed to make copies or tracings from the files or records of the office. Such copies will be furnished, when ordered, at the rates already specified. — 109. The money for the payment of fees may be paid to the Commissioner, or to the Treasurer, or any of the assistant treasurers of the U. States, or to any of the designated depositaries, national banks, or receivers of public money, designated by the Secretary of the Treasury for that purpose, who shall give the depositor a receipt or certificate of deposit therefor, which shall be transmitted to the Patent Office. When this cannot be done without much inconvenience, the money may be remitted by mail, and in every such case the letter should state the exact amount enclosed. Letters containing money may be registered. Post-office money-orders now afford a safe and convenient mode of transmitting fees. All such orders should be made payable to the "Commissioner of Patents." The weekly issue will close on Friday at two o'clock. If the final fee in any application is not paid before this time, the patent will not go to issue until the following week. When patents are to issue to assignees the assignment must be on record before the closing of the issue, and the request to issue to an assignee must be made in writing at the time of paying the final fee. — 110. All money sent by mail, either to or from the Patent Office, will be at the risk of the owner. In no case should money be sent enclosed with models. All payments to or by the office must be paid in specie, treasury notes, national bank-notes, certificates of deposit, or post-office money-orders.

Registration of Prints and Labels. — By an act of Congress approved June 18, 1874, it is provided that certain prints and labels may be registered in the Patent Office; and *Sect.* 3. That in the construction of this act the words "engraving," "cut," and "print" shall be applied only to pictorial illustrations of works connected with the fine arts, and no prints or labels designed to be used for any other articles of manufacture shall be entered under the copyright law, but may be registered in the Patent Office. And the Commissioner of Patents is hereby charged with the supervision and control of the entry or registry of such prints or labels, in conformity with the regulations provided by law as to copyright of prints, except that there shall be paid for recording the title of any print, or label, not a trade-mark, six dollars, which shall cover the expense of furnishing a copy of the record, under the seal of the Commissioner of Patents, to the party entering the same. *Sect.* 4. That all laws and parts of laws inconsistent with the foregoing provisions be and the same are hereby repealed. — By the word "print," as used in the said act, is meant any device, picture, word or words, figure or figures (not a trade-mark), impressed or stamped directly upon the articles of manufacture, to denote the name of the manufacturer, or place of manufacture, style of goods, or other matter. By the word "label," as therein used, is meant a slip or piece of paper, or other material, to be attached in any manner to manufactured articles, or to bottles, boxes, and packages containing them, and bearing an inscription (not a trade-mark), as, for example, the name of the manufacturer or the place of manufacture, the quality of goods, directions for use, etc. By the words "articles of manufacture," to which such print or label is applicable by said act, are meant all vendible commodities produced by hand, machinery, or art. But no such print or label can be registered, unless it properly belong to an article of commerce, and be as above defined; nor can the same be registered as such print or label when it amounts in law to a technical trade-mark. To

entitle the owner of any such print or label to register the same in this office, it is necessary that five copies of the same be filed, one of which copies shall be certified under the seal of the Commissioner of Patents, and returned to the registrant. The certificate of such registration will continue in force for twenty-eight years. The fee for registration of a print or label is six dollars, to be paid in the same manner as fees for patents. The benefits of this act seem to be confined to citizens or residents of the U. States.

FORMS.

Petitions.

1. *By a Sole Inventor.*

To the Commissioner of Patents:

Your petitioner, a resident of ——, ——, prays that letters-patent be granted to him for the invention set forth in the annexed specification.

A. B.

2. *By Joint Inventors.*

To the Commissioner of Patents:

Your petitioners, residing respectively in ——, ——, and ——, ——, pray that letters-patent may be granted to them, as joint inventors, for the invention set forth in the annexed specification.

A. B.
C. D.

3. *By an Inventor for Himself and an Assignee.*

To the Commissioner of Patents:

Your petitioner, a resident of ——, prays that letters-patent may be granted to himself and C. D., of ——, as his assignee, for the invention set forth in the annexed specification, the assignment to the said C. D. having been duly recorded in the Patent Office, in liber —, page —.

A. B.

4. *By an Administrator.*

To the Commissioner of Patents:

Your petitioner, A. B., of ——, ——, administrator of the estate of C. D., deceased (as by reference to the duly certified copy of letters of administration, hereto annexed, will more fully appear), prays that letters-patent may be granted to him for the invention of the said C. D., set forth in the annexed specification.

A. B., *Administrator, etc.*

5. *By an Executor.*

To the Commissioner of Patents:

Your petitioner, A. B., of ——, ——, executor of the last will and testament of C. D., deceased (as by reference to the duly certified copy of letters testamentary, hereto annexed, will more fully appear), prays that letters-patent may be granted to him for the invention of the said C. D., set forth in the annexed specification.

A. B., *Executor, etc.*

6. *For a reissue (by the inventor).*

To the Commissioner of Patents:

Your petitioner of ——, ——, prays that he may be allowed to surrender the letters-patent for an improvement in coal-scuttles, granted to him May 16, 1867, whereof he is now sole owner, [or "whereof C. D., on whose behalf and with whose assent this application is made, is now sole owner, by assignment,"] and that letters-patent may be reissued to him [or "the said C. D.,"] for the same invention, upon the annexed amended specification. Accompanying this petition is an abstract of title, duly certified, as required in such cases.

A. B.

Assent of Assignee to Reissue.

The undersigned, assignee of the entire [or an undivided] interest in the above-mentioned letters-patent, hereby assents to the accompanying application.

C. D.

7. *For a Reissue (by Assignee).*

(To be used only when the inventor is dead, or the original patent was issued and assigned prior to July 8, 1870).

To the Commissioner of Patents:

Your petitioners, of the city of ——, State of ——, pray that they may be allowed to surrender the letters-patent for an improvement in coal-scuttles, granted May 16, 1867, to E. F., now deceased, whereof they are now owners, by assignment, of the entire interest, and the letters-patent may be reissued to them for the same invention, upon the annexed amended specification. Accompanying this petition is an abstract of title, duly certified, as required in such cases.

A B
C. D.

8. *For an Extension (by a Patentee).*

To the Commissioner of Patents

Your petitioner, now residing at ——, ——, prays that Letters-Patent No. 12841, for an improvement in steam-engines, granted to him August 17, 1853, may be extended for seven years from and after the expiration of the original term.

A. B.

9. *For an Extension (by an Administrator).*

To the Commissioner of Patents:

Your petitioner, A. B., of ——, ——, administrator of the estate of C. D., deceased, (as by reference to the duly-certified copy of letters of administration, hereto annexed, will more fully appear,) residing at ——, ——, prays that Letters-Patent No. 12842, for an improvement in stoves, granted to said C. D., August 24, 1853, may be extented for seven years from and after the expiration of the original term.

A. B., *Administrator.*

10. *For Letters-Patent for a Design.*

To the Commissioner of Patents:

Your petitioner, residing in ——, ——, prays that letters-patent may be granted to him for the term of three and one half years [or "seven years," or "fourteen years"] for the new and original design set forth in the annexed specification.

A. B.

11. *For the Registration of a Trade-Mark.*

To the Commissioner of Patents:

Your petitioner [or petitioners, if a firm] respectfully represents that he [or it, if a corporation] is engaged in the manufacture of ——, at ——, and at ——, ——, and that he is entitled to the exclusive use upon the class of goods which he manufactures of the trade-mark described in the annexed statement or specification [and accompanying fac-simile].

He therefore prays that he may be permitted to obtain protection for such lawful trade-mark under the law in such cases made and provided.

A. B.

12. *For the Renewal of an Application.*

To the Commissioner of Patents:

Your petitioner represents that on May 8, 1868, he filed an application for letters-patent for an improvement in churns, which application was allowed July 7, 1868, but that he failed to make payment of the final fee within the time allowed by law. [Or "which application has been rejected, but has not been abandoned."] He now makes renewed application for letters-patent for said invention, and prays that the original specification, oath, drawings, and model may be used as a part of this application.

A. B.

13. *Petition with Power of Attorney.*

To the Commissioner of Patents:

Your petitioner, a resident of the city of ——, State of ——, prays that letters-patent may be granted to him for the invention set forth in the annexed specification; and he hereby appoints C. D., of the city of ——, State of ——, his attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

A. B.

14. *Power of Attorney.*

If the power of attorney be given at any time other than that of making application for patent, it will be in substantially the following form:

To the Commissioner of Patents:

The undersigned having, on or about the 20th day of July, 1859, made application for letters-patent for an improvement in a horse-power, hereby appoints C. D., of the city of ——, State of ——, his attorney, with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

A. B.

Signed at ——, and State of ——, this —— day of ——, 18—.

15. *Revocation of Power of Attorney.*

The undersigned having, on or about the 26th day of December, 1867, appointed C. D., of the city of ——, and State of ——, his attorney to prosecute an application for letters-patent, made on or about the 1st day of June, 1868, for an improvement in the running gear of wagons, hereby revokes the power of attorney then given.

Signed at ——, ——, this 21st day of July, 1869.

A. B.

Specification.

16. *For a Mechanical Device.*

(*See Rule* 19 *for instructions in making drawings.*)

To all whom it may concern:

Be it known that I, —— —— (*here insert name in full*), of ——, in the county of ——, and State of ——, have

invented a new and useful improvement in expansive gearing for calender and feeding-rolls, of which the following is a specification:

The invention relates to expansive gearing for calender-rolls and feeding-rolls, for wood-working and other machines.

Heretofore such rolls have been connected, either directly by means of gear-wheels secured to their shafts and revolving in the same plane, or indirectly by intermediate gears attached to shafts extending across the machine and connected by links to the ordinary gearing. The first method is objectionable for the reason that it limits the diameter of the wheels, which can exceed that of the rolls only to the extent required to be operative in transmitting motion; and as a coarse pitch is desirable in such gearing, the true diameter to the pitch line is less than that of the rolls themselves, and under great and unusual strain the wheels are very liable to break. The second method is objectionable because the cross-shafts are an obstruction to the operation of feeding the material to the rolls, and because it does not permit a free and independent adjustment of the rolls at either end.

The object of my invention is to provide a system of gearing for calender and feed rolls which will automatically conform to any desired adjustment of the rolls, whether it be at one or at both of their extremities; and further, to secure a sufficient bearing for the shafts of the intermediate gears.

The invention consists in the arrangement of the upper and lower gear-wheels in different planes of revolution in connection with mechanism whereby motion is transmitted from one roll to the other. It also consists in applying the intermediate gearing mechanism independently to both ends of the rolls. And it finally consists in the particular construction and arrangement of the gearing mechanism.

In the accompanying drawing, in which similar letters of reference indicate like parts, figure 1 is a perspective of a device embodying my invention, figure 2 is a vertical longitudinal section of the same, figure 3 is an end elevation, and figure 4 a detail view of the swinging gear supporting device.

[Here comes the technical description referring to the drawings.]

What I claim is —

1. The combination of two rolls, each provided with a gear-wheel on its shaft, said gears revolving in different planes, with a train of intermediate gearing mechanism, substantially as described.

2. The combination with a pair of rolls provided at their ends with gears revolving in different planes, of two trains of independent intermediate gearing mechanism, substantially as described, whereby angular adjustment of the upper roll with reference to the lower one is secured, as set forth.

3. In combination with the wheels revolving in different planes, the gear-supporting arm G, provided with the hollow shaft F, the two gears I, link P, and gear M, the latter provided with a hub, O, and mounted on a stud, N, supported by the arm, G, substantially as described.

A. B.

Witnesses: C. D.
E. F.

17. *For a Process.*

To all whom it may concern:

Be it known that I [here insert the name of the inventor], of ——, in the county of ——, and State of ——, have invented a new and useful process for separating smut and other impurities from wheat, which process is fully set forth in the following specification: —

This invention relates to that class of processes employed for removing "smut" and other impurities mixed with and adhering to grain; and it consists in mixing "newly slaked" lime, while yet warm, with the grain before it is passed through the smut-mill.

In carrying out our invention, take of lime newly slaked, and while yet warm, one and a half pounds to each one hundred pounds of wheat. Mix the lime well with the wheat, let it stand one hour, then pass it through a smut-mill in the usual way, and it will be found that all the lime, smut, dirt, and other impurities attached to the wheat of every kind (and which no smut-mill without my liming process will fully separate), will be entirely removed, and the flour will be as white and as sweet as though made from the best of wheat.

We are aware that lime has before been used for the purpose of cleaning wheat, being first mixed with the grain as above proposed, and the whole being then passed through a smut-mill; but in all previous processes, so far as we are aware, the lime has been used in a cold state, and for this reason they have proved ineffectual. We propose to take lime newly slaked and while yet warm.

We claim as our invention —

The process of cleaning wheat by mixing with it lime newly slaked and warm before passing it through a smut-mill, so as to cleanse the wheat from all impurities, substantially as described.

A. B.
C. D.

Witnesses: E. F.
G. H.

18. *For a Composition of Matter.*

To all whom it may concern:

Be it known that I [here insert the name of the inventor], of ——, in the county of ——, and State of ——, have invented a new and useful compound called "wool-oil," which compound is fully described in the following specification —

This invention relates to that class of compounds used to lubricate wool in the process of manufacture; and it consists in a composition formed by mixing any one or more of the oils ordinarily used in manufacturing wool, such as olive, lard, or rape-seed oil, with a solution of an oil-soap.

To prepare the wool-oil, take a quantity of oil-soap of any kind, provided the quality be good, and dissolve the same in hot water, say about thirty pounds of oil-soap to thirty gallons of water, or a sufficient quantity of soap to saturate the water. Then take equal parts, by measure, of olive, lard, rape-seed, or any other kind of oil which can be used on wool in the process of its manufacture, and mix with it the preparation aforesaid, to wit, the soap solution, which, after such mixture, is ready to be used on the wool with as beneficial an effect as if pure oil only had been used. This wool-oil will not decompose by age, because the oil of soap neutralizes the stearine in the oil; hence there is nothing to decompose. And for the same reason spontaneous combustion cannot be produced.

I claim —

A compound consisting of an oil or oils, ordinarily used in the lubrication of wool, in combination with a solution of an oil-soap, substantially as and for the purpose specified

C. D.

Witnesses: E. F.
G. H.

19. *For a Design.*

To all whom it may concern:

Be it known that I [here insert the name of the originator of the design], of ——, in the county of ——, and State of ——, have originated and designed a pattern for carpets, or other fabrics, of which the following is a full, clear, and exact description, reference being had to the accompanying photographic illustration [or drawing], making part of this specification: —

A represents a portion of the body of the carpet and B a portion of the border. The body may be ornamented with any figures that may be selected; the border consists of three parallel stripes, the middle one wide, and the other two narrow. Along the middle stripe of the border run two angular bars, crossing each other and intertwining, as shown, while the narrow stripes are ornamented with rows of spots arranged in groups of three, so as to form triangles. Suitable colors should be employed to produce a harmonious effect.

What I claim as my invention is —

A design for a carpet in which the border is composed of stripes ornamented substantially in the manner above described.

20. *For a Trade-Mark.*

[*If the application is made by a corporation or a firm this form should be modified to conform to the facts.*]

To all whom it may concern·

Be it known that I [here insert the name of the applicant], domiciled in [the U. States, or in the Dominion of Canada, or as the case may be], and residing at ——, and doing business at ——, in the county of ——, and State of ——, have adopted [or intend to adopt] for my use a trade-mark for ——, of which the following specification is a full, clear, and exact description: —

My trade-mark consists of the letters and words, "S. N & Co.'s Buckeye Sheetings." These generally have been arranged as shown in the accompanying fac-simile; above and below a figure of a man represented as ascending the side of a mountain and carrying a banner, upon which is inscribed the word "Buckeye"; and the whole has been enclosed within an ornamental border substantially like that shown in the fac-simile. But the figure of the man with the banner may be omitted, or some other device substituted for it, and the border may be changed at pleasure or omitted altogether without materially changing the character of my trade-mark, the essential features of which are the letters "S. N. & Co.'s" and the word symbol "Buckeye."

This trade-mark I have used in my business for ten years last past.

The class of merchandise to which the trade-mark is appropriated is ——; and the particular description of goods [comprised in said class] upon which I intend to use my said trade-mark are —— I have been accustomed to print it in blue ink upon each piece of said goods, and also to have it printed on labels, which I afterward paste upon said articles or on boxes and cases containing the same.

A. B.

Witnesses: C. D.
F. H.

21. *Amendment.*

WASHINGTON, D. C., July 20, 1869.

To the Commissioner of Patents:

In the matter of my application for letters-patent for an

improvement in wagon-brakes, I hereby amend my specification by striking out all between the ninth and twentieth lines, inclusive, on page 3; by inserting the words "*connected with*" after the word "*and*" in the first line of the second claim; and by striking out the third claim and substituting therefor the following:—

3 The combination of the self-acting brake, C, pin, A, and slotted flanges, D, substantially as described, and for the purposes set forth.

A. B.,
By C. D.,
His Attorney in Fact.

OATHS.

22. *By a Sole Inventor.*

(To follow specification.)

STATE OF ———, *County of* ———, *ss:*

A. B, the above-named petitioner, being duly sworn (or affirmed), deposes and says that he verily believes himself to be the original and first inventor of the improvement in seed-drills described and claimed in the foregoing specification; that he does not know and does not believe that the same was ever before known or used; and that he is a citizen of ———, and a resident of ———.

A. B.

Sworn to and subscribed before me this 13th day of March, 1869.

C. D.,
Justice of the Peace.

[If the applicant be an alien, the sentence "and that he is a citizen of the U. States" will be omitted, and in lieu thereof will be substituted "and that he is a citizen of the Republic of Mexico," or "and that he is a subject of the King of Italy," or "of the Queen of Great Britain," or as the case may be.

If the applicants claim to be *joint inventors*, the oath will read "that they verily believe themselves to be the original, first, and joint inventors," etc.

If the inventor be dead, the oath will be taken by the administrator or executor, and will declare his belief that the party named as inventor was the original and first inventor.]

23. *By an Applicant for a Reissue* (*Inventor*).

STATE OF ———, *City and County of* ———, *ss:*

A. B, the above-named petitioner, being duly sworn (or affirmed), deposes and says that he verily believes that, by reason of an insufficient or defective specification, his aforesaid letters-patent are inoperative or invalid; that the said error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, to the best of his knowledge and belief; that he is the sole owner of said letters-patent [or, "that E. F. is the sole owner of said letters-patent, and that this application is made on the behalf and with the consent of said E. F."]; and that he verily believes himself to be the first and original inventor of the improvement set forth and claimed in this amended specification.

A. B.

Sworn to and subscribed before me this 26th day of July, 1869.

C. D.,
Notary Public.

[Notarial seal.]

24. *By an Applicant for a Reissue* (*Assignee*).

(To be used only when the inventor is dead or when the patent was issued and assigned prior to July 8, 1870.)

STATE OF ———, *County of* ———, *ss:*

A B and C. D., the above-named petitioners, being duly sworn (or affirmed), depose and say that they verily believe that, by reason of an insufficient specification, the aforesaid letters-patent granted to E. F. are inoperative; that the said error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, to the best of their knowledge and belief; that the entire title to said letters-patent is vested in them: and that they verily believe the said E. F. to be the first and original inventor of the invention set forth and claimed in the foregoing amended specification; and that the said E. F. is now deceased.

A. B.
C. D.

Sworn to and subscribed before me this 14th day of November, 1869.

A. B.,
Justice of the Peace.

25. *By an Applicant for Extension* (*Patentee*).

STATE OF ———, *County of* ———, *ss:*

A. B., the above-named applicant, being duly sworn (or affirmed), deposes and says that the foregoing statement and account by him signed are correct and true in all respects and particulars, to the best of his knowledge and belief.

A. B.

Sworn to and subscribed before me this 1st day of November, A. D. 1868.

C. D.,
Justice of the Peace.

26. *By an Applicant for an Extension* (*Executor*).

STATE OF ———, *County of* ———, *ss:*

A. B., executor of the last will and testament of Simon Newcome, deceased, being duly sworn (or affirmed), deposes and says that the foregoing statement and account by him subscribed are correct and true in all respects and particulars, to the best of his information, knowledge, and belief.

A. B.,
Executor, etc.

Sworn to and subscribed before me this 20th day of May, 1869.

C. D.,
Justice of the Peace.

27. *Supplemental Oath to accompany a New or an Enlarged Claim.*

STATE OF ———, *County of* ———, *ss:*

A. B., whose application for letters-patent for an improvement in seed-drills was filed in the U. States Patent Office on or about the 15th day of March, 1869, being duly sworn (or affirmed), deposes and says that, in addition to the claims originally made, he verily believes himself to be the original and first inventor of the improvement as described and claimed in the foregoing amendment, and that he does not know, and does not believe, that the same was ever before known or used.

A. B.

Sworn to and subscribed before me this 11th day of July, 1870.

C. D.,
Justice of the Peace.

28. *Oath as to the Loss of Letters-Patent.*

STATE OF ———, *County of* ———, *ss:*

A. B., of said county, being duly sworn (or affirmed), doth depose and say that the Letters-Patent No. 12213, granted to him, and bearing date on the 9th day of January, A. D. 1855, have been either lost or destroyed; that he has made diligent search for the said letters-patent in all places where the same would probably be found, if existing, and that he has not been able to find them.

A. B.

Subscribed and sworn to before me this 5th day of October, 1868.

C. D.,
Justice of the Peace.

29. *Oath of Administrator as to the Loss of Letters-Patent.*

STATE OF ———, *County of* ———, *ss:*

A. B., of said county, being duly sworn, doth depose and say that he is administrator of the estate of E. F., deceased, late of Boston, in said county; that the Letters-Patent No. 12219, granted to said E. F., and bearing date on the 9th day of January, A. D. 1855, have been lost or destroyed, as he verily believes; that he has made diligent search for the said letters-patent in all places where the same would probably be found, if existing, and especially among the papers of the decedent, and that he has not been able to find said letters-patent.

A. B.,
Administrator, etc.

Subscribed and sworn to before me this 5th day of October, 1868.

C. D.,
Justice of the Peace.

30. *Oath of Applicant for Registration of a Trade-Mark.*

[*If the application is made by a corporation, or a firm, this form should be modified to conform to the facts.*]

STATE OF ———, *County of* ———, *ss:*

A. B., being duly sworn, deposes and says that he is the applicant named in the accompanying petition; that he verily believes that the facts set forth in the foregoing specification are true; that he has a right to the use of the trade-mark described in said specification; that no other person, firm, or corporation has the right to such use, either in the identical form or in any such near resemblance thereto as might be calculated to deceive; that the description and fac-similes presented for record are true copies of the trade-mark sought to be protected, and that he is a citizen of the U. States (or, a citizen of the Republic of France, or, as the case may be).

A. B.

Sworn to and subscribed before me this 15th day of ———, 187—.

E. F.,
Justice of the Peace.

APPEALS.

31. *From the Examiner to the Examiners-in-Chief.*

To the Commissioner of Patents:

SIR: I hereby appeal to the examiners-in-chief from the decision of the principal examiner in the matter of my application for letters-patent for an improvement in wagon-brakes, which, on the 20th day of July, 1869, was rejected the second time. The following are assigned for reasons of appeal: (Here follow the reasons.)

A. B.

31*a*. *From the Examiner of Trade-Marks to the Commissioner.*

To the Commissioner of Patents:

SIR: I hereby appeal to you in person from the decision of the examiner of trade-marks, dated Nov. 15, 1872, in the matter of my application for the registration of a trade-mark for cigars. The following are the reasons assigned: (Here follow the reasons.)

32. *From the Examiner in charge of Interferences to the Examiners-in-Chief.*

To the Commissioner of Patents:

SIR: I hereby appeal to the examiners in-chief from the decision of the principal examiner in charge, in the matter of the interference between my application for letters-patent for improvement in sewing-machines and the letters-patent of A. B, in which priority of invention was awarded to said A. B. The following are assigned for reasons of appeal: (Here follow the reasons.)

C. D.

33. *From the Examiners-in-Chief to the Commissioner.*

To the Commissioner of Patents:

SIR: We hereby appeal to the commissioner in person from the decision of the examiners-in-chief, in the matter of our application for the reissue of letters-patent for an improvement in cotton-presses, granted to A. B., May 18, 1865. The following are assigned for reasons of appeal: (Here follow the reasons.)

C. D.
E. F.

34. *From the Commissioner to the Supreme Court of the District of Columbia.*

WASHINGTON, D. C., July 20, 1871.

To the Supreme Court of the District of Columbia, in banc:

The petition of A. B., of ——, in the county of ——, and —— ——, respectfully showeth: That he has heretofore invented a new and useful improvement in velocipedes; that on or about the 1st day of May, 1870, he applied to the Patent Office of the U. States for a patent for the same [or for the reissue of a patent granted therefor under date of June 10, 1862], and complied with the requirements of the several acts of Congress, and with the rules of the Patent Office prescribed in such cases; that his said application was rejected by the Commissioner of Patents on appeal to him on or about June 20, 1871; that he has filed in said office due notice to the Commissioner of Patents of this his appeal, accompanied with the reasons of appeal; and that the commissioner has furnished him with complete copies of all the original papers and evidence in the case, all of which, together with a copy of the reasons of appeal, accompany this petition, and are to be taken as a part hereof.

And the said A. B. prays that his said appeal may be heard and determined by your honorable court at such early time as may be appointed for that purpose; and that the Commissioner of Patents may be duly notified of the same, and directed in what manner to give notice thereof to the parties interested.

A. B.

To the Commissioner of Patents:

A. B., of ——, in the county of ——, and State of ——, hereby gives notice that he has appealed from your decision, rendered on or about the 20th day of June, 1871, rejecting his application for a patent [or, for a reissue of a patent granted to him June 10, 1862] for an improvement in velocipedes; and of this you are respectfully requested to take notice.

And the said A. B. assigns the following reasons for appealing from the said decision of the Commissioner of Patents, viz: —

[Here follow reasons, which should be full and explicit, and constitute a brief of the appellant's argument.]

A B.

35. *Rules of the Supreme Court in Appeals from the Commissioner of Patents adopted November* 30, 1870.

1. The appellant's petition shall be addressed to the court, and shall be substantially as follows: —

"*To the Supreme Court of the District of Columbia, in banc,* —— —, 187—.

"The petition of —— ——, a citizen of ——, in the [*State, Territory, District*] of —— ——, respectfully shows as follows: —

"*a.* About the —— day of ——, 18—, I invented [*describe the subject of the desired patent in the identical words of the application to the Patent Office*].

"*b.* On the —— day of ——, 18—, in the manner prescribed by law, I presented my application to the Patent Office, praying that a patent be issued to me for said invention.

"*c.* Such proceedings were had in said office, upon said application, that on the —— day of ——, 18—, it was rejected by the Commissioner of Patents.

"*d.* I thereupon appealed to this court, and gave notice thereof to the commissioner, and filed in his office the following reasons for said appeal: —

"*e.* The Commissioner of Patents has furnished me a complete copy of all the proceedings in his office upon my said application, which copy has been filed herewith, and is to be taken as part hereof.

"*f.* And thereupon I pray that the court do revise and reverse said decision, to the end that justice may be done in the premises.

" —— ——."

2. This petition shall be filed in the clerk's office of this court; and as soon as the petitioner has made the deposit required by law at the commencement of suits in this court, or said deposit has been dispensed with, the clerk shall enter the case in a docket to be provided by him for the purpose, and in which a brief of said filing and of all subsequent proceedings in the case shall be entered as and when they successively occur, down to and including the final decision.

3. The clerk shall provide a minute-book of his office, in which he shall record every order, rule, judgment, or decree of the court in each case, in the order of time in which said proceedings occur; and of this book there shall be two alphabetical indexes, one showing the name of the party applying for the patent, and the other designating the invention by its subject-matter or name.

4. The cases in the docket of causes shall be successively numbered from No. 1 onward, and each case shall also be designated by the number assigned to it on the records of the Patent Office.

5. This docket shall be called for the trial of the cases thereon on the first day of each session of this court in general term, provided the petition has been filed ten days before the commencement of the term.

6. The opinions of the court, when written, shall be kept by the clerk in the order of their delivery, and in a temporary book-file, indexed; and when so many have been delivered as will make a volume of convenient size, he shall cause them to be bound.

7. The clerk shall furnish to any applicant a copy of any paper in any of said appeals on payment of the lawful fees.

8. Hearings of said appeals shall be subject to the rules of the court provided for other causes therein.

9. When the testimony of the commissioner, or of any examiner, touching the principles of invention in question shall be deemed necessary, it shall be taken orally in open court, unless otherwise ordered by the court. And, in such case, the court may order it to be reduced to writing, and filed or entered on its minutes, if it think proper.

10 The final judgment or order of the court shall not recite any of the facts made to appear in the case, but shall be to the following effect: —

"This appeal having been heard upon the record from the Patent Office [and upon the testimony of the Commissioner of Patents,] [of one of the examiners,] [touching the principles of the invention,] and having been argued by [counsel for] the petitioner and [for] the commissioner.

"It is thereupon ordered and adjudged that the [petition be dismissed] [Commissioner do issue to the petitioner a patent,] [as prayed,] [granting the petitioner (*so and so*)]

"And that the clerk of this court transmit to the Commissioner of Patents a copy of this decree duly authenticated."

36. *Disclaimer.*

To the Commissioner of Patents:

Your petitioner, A. B., of ——, county of ——, and State of ——, represents that he has, by grants duly recorded in the U. States Patent Office (liber —, p. —), become the owner of an exclusive right within and for the several States of (Maine, New Hampshire, and Vermont) to make, use, and vend to others to be used, a certain improved mechanical movement, for which letters-patent of the U. States were granted to C D., of ——, in the county of ——, and State of ——, April 1, 1869; that he has reason to believe that, through inadvertence, accident, or mistake, the specification and claim of said letters-patent are too broad, including that of which said patentee was not the first inventor. Your petitioner, therefore, hereby enters his disclaimer to that part of the claim in said specification which is in the following words, to wit: —

"I also claim the sleeves, A B, having each a friction cam, C, and connected, respectively, by means of chains or cords, K L and M N, with an oscillatory lever, to operate substantially as herein shown and described."

A. B.

Witness:
C. D.

ASSIGNMENTS.

38. *Of an entire Interest in an Invention before the Issue of Letters-Patent.*

Whereas I, A B., of ——, county of ——, State of ——, have invented a certain new and useful invention, or improvement in —— (giving title of the same), for which I am about to make application for letters-patent of the U. States, and

whereas, G. D., of ———, county of ———, State of ———, is desirous of acquiring an interest in said invention, and in the letters-patent to be obtained therefor:—

Now, therefore, to all whom it may concern, be it known, that for and in consideration of the sum of ——— dollars, to me in hand paid, the receipt of which is hereby acknowledged, I, the said A. B., have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over unto the said G. D., the full and exclusive right to the said invention, as fully set forth and described in the specification prepared and executed by me preparatory to obtaining letters-patent of the U. States therefor, and I do hereby authorize and request the Commissioner of Patents to issue the said letters-patent to the said G. D., as the assignee of my entire right, title, and interest in and to the same, for the sole use and behoof of the said G. D. and his legal representatives.

In testimony whereof I have hereunto set my hand and affixed my seal this ——— day of ———, A. D. 187—.

A. B. [SEAL.]

In presence of:
O. P.
S. T.

39. *Of the Entire Interest in Letters-Patent.*

Whereas, I, C. D., of ———, county of ———, State of ———, did obtain letters-patent of the U. States for (mentioning the title of the invention) which letters-patent are numbered ———, and bear date the ——— day of ———, in the year one thousand eight hundred and ———, and whereas I am now the sole owner of said patent and of all rights under the same; and whereas E. F., of ———, county of ———, State of ———, is desirous of acquiring the entire interest in the same:

Now, therefore, to all whom it may concern, be it known, that for and in consideration of the sum of ——— dollars, to me in hand paid, the receipt of which is hereby acknowledged, I, the said C. D., have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over unto the said E. F., all the right, title, and interest whatsoever which I have in and to the said improvement in (title), and in and to the letters-patent therefor aforesaid; the same to be held and enjoyed by the said E. F., for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters-patent are or may be granted (thus including extension), as fully and entirely as the same would have been held and enjoyed by me had this assignment and sale not been made.

In testimony whereof — have hereunto set — hand and affixed — seal this —— day of ———, A. D. 187-.

C D. [SEAL.]

In presence of:
N P.
O. T.

40. *Of an Undivided Interest in the Letters-Patent.*

Whereas, I, L. M., of ———, county of ———, State of ———, did obtain letters-patent of the U. States for (giving title), which letters-patent are numbered ———, and bear date the ——— day of ———, in the year one thousand eight hundred and ———; and whereas D. E., of ———, county of ———, State of ———, is desirous of acquiring an interest in the same:

Now, therefore, to all whom it may concern, be it known, that for and in consideration of the sum of ——— dollars, to me in hand paid, the receipt of which is hereby acknowledged, I, the said L. M., have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over unto the said D. E., the undivided one half part of all the right, title, and interest whatsoever which I have in and to the said invention, and in and to the letters-patent therefor aforesaid; the said undivided one half part to be held and enjoyed by the said D. E., for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters-patent are or may be granted (thus including extension), as fully and entirely as the same would have been made and enjoyed by me had this assignment and sale not been made.

In testimony whereof — have hereunto set — hand and affixed — seal this ——— day of ———, A. D. 186-.

——— ———. [SEAL.]

In the presence of:
——— ———.
——— ———.

41. *Territorial Interest after Grant of Patent.*

Whereas I, Q. X., of ———, county of ———, State of ———, did obtain letters-patent of the U. States for (giving title), which letters-patent are numbered ———, and bear date the ——— day of ———, in the year one thousand eight hundred and ———; and whereas I am now the sole owner of the said patent and of all rights under the same in the below-recited territory; and whereas W. O., of ———, county of ———, State of ———, is desirous of acquiring an interest in the same:

Now, therefore, to all whom it may concern, be it known, that for and in consideration of the sum of ——— dollars, to me in hand paid, the receipt of which is hereby acknowledged, I, the said Q. X., have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over, unto the said W. O., all the right, title, and interest whatsoever which I have in and to the said invention (or improvement), as secured to me by said letters-patent, for, to, and in the State of ———, and for, to, or in no other place or places; the same to be held and enjoyed by the said W. O. within and throughout the above-specified territory, but not elsewhere, for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters-patent are or may be granted (thus including extension), as fully and entirely as the same would have been held and enjoyed by me therein had this assignment and sale not been made.

In testimony whereof — have hereunto set — hand and affixed — seal this ——— day of ——— A. D. 186-.

Q. X. [SEAL.]

In the presence of:
S. T.
R. D.

42. *License. — Shop-Right.*

In consideration of fifty dollars, to be paid by the firm of S. J. & Co., of ———, I do hereby license and empower the said S. J. & Co. to manufacture in said ———, or some other place or places as he or his firm may elect, the improvement in cotton-seed planters for which letters-patent of the U. States No. 71,846 were granted to me November 13, 1868, and to sell the machines so manufactured throughout the U. States, to the full end of the term for which said letters-patent are granted

Witness my hand this 22d day of April, 1869.

A. B.

43. *License — not exclusive — with Royalty.*

This agreement, made this 12th day of September, 1868, between A B, party of the first part, and C. D. & Co., party of the second part, witnesseth that, whereas letters-patent of the U. States for an improvement in horse-rakes were granted to the party of the first part, dated October 4, 1867; and whereas the party of the second part is desirous of manufacturing horse-rakes containing said patented improvement: Now, therefore, the parties have agreed as follows:

I. The party of the first part hereby licenses and empowers the party of the second part to manufacture, subject to the conditions hereinafter named, at their factory in ———, and in no other place or places, to the end of the term for which said letters-patent were granted, horse-rakes containing the patented improvements, and to sell the same within the U. States.

II. The party of the second part agrees to make full and true returns to the party of the first part, under oath, upon the first days of July and January in each year, of all horse-rakes containing the patented improvements manufactured by them.

III. The party of the second part agrees to pay to the party of the first part five dollars as a license fee upon every horse-rake manufactured by said party of the second part containing the patented improvements; provided, that if the said fee be paid upon the days provided herein for semi-annual returns, or within ten days thereafter, a discount of fifty per cent shall be made from said fee for prompt payment.

IV. Upon a failure of the party of the second part to make returns, or to make payment of license fees, as herein provided, for thirty days after the days herein named, the party of the first part may terminate this license by serving a written notice upon the party of the second part; but the party of the second part shall not thereby be discharged from any liability to the party of the first part for any license fees due at the time of the service of said notice.

In witness whereof the parties above named (the said Uniontown Agricultural Works, by its president) have hereunto set their hands the day and year first above written.

A B.
C. D. & CO.

44. *Transfer of a Trade-Mark.*

We, A. B. and C. D., of ———, partners under the firm name of B. and D, in consideration of five hundred dollars to us paid by E. F., of the same place, do hereby sell, assign, and transfer to the said E. F. and his assigns the exclusive right to use in the manufacture and sale of stoves a certain trade-mark for stoves deposited by us in the U. States Patent Office, and recorded therein July 15, 1870; the same to be held, enjoyed, and used by the said E F, as fully and entirely as the same would have been held and enjoyed by us if this grant had not been made.

Witness our hands, this 20th day of July, 1870. A. B.
C. D.

EXTENSIONS.

45 *Statement and Account.*

In the matter of the application of A B., of the city, county, and State of New York, executrix of the last will and testament of C. D, deceased, for extension of Letters-Patent No. 10,817, granted to him January 9, 1855, for improvements in mowing-machines.

To the Commissioner of Patents:

The applicant respectfully represents that, prior to obtaining the letters-patent now sought to be extended, the said C. D. was a farmer; that his attention was called to the subject of mowing-machines by the difficulty of cutting grass by the machines then in use; that, after numerous patient and costly experiments, he succeeded in perfecting his invention and in obtaining his patent. He immediately made arrangements to manufacture the improvement, and for this purpose sold three fourths of his farm. He then, with others, built a factory and commenced operations; but two years afterward, the establishment was destroyed by fire, without insurance. In the exposure at the fire C. D. contracted a disease which confined him to the house for three years, when he died, leaving applicant, his executrix and widow, with a large family and small means. Nevertheless, applicant made every effort to induce manufacturers to use the improvement, and at last succeeded in inducing the firm of E. T. & Co., of ———, to recommence the manufacture of the machines. But after four years the firm failed, being largely in debt to applicant for royalties. After this it became impossible for applicant to do anything with the invention. She wrote to various manufacturers, and made personal application to others, but found them unwilling to make arrangements to pay royalties, or to use the invention in any way, unless she would sell the patent, including the extension, for a nominal sum. She states, however, that she has at length succeeded in perfecting an agreement with G. H. & Co., of ———, conditioned upon the extension, whereby the said firm agreed to manufacture the patented machines, and to pay her a royalty of three dollars upon each one made. Aside from the interest so vested in G. H. & Co., the entire interest in the extension remains vested in her, and she has made no assignment, contract, or agreement of any kind for the sale or assignment of the extended term to any person whatsoever.

The following is believed to be a correct statement of receipts and expenditures, and is as full as it is possible to make it: —

Receipts.

From profits from business (for particulars of which see Schedule A)	$1,236 00
From royalties from E. T. & Co. (for details of which see Schedule B)	2,341 50
From sale of shop-right to L. M.	250 00
Total receipts	3,827 50

Expenditures.

Expense of procuring patent	250 00
Net receipts	3,577 50

The invention is exceedingly useful, as will be abundantly proved. The testimony will show that it has been introduced upon 20,000 mowing-machines, and has increased the value of said machines not less than three dollars each. It is evident, therefore, that the public have been greatly benefited by the use of this invention; while the fact that C. D. invested his entire time and means, and finally lost his life in the prosecution of his invention, is respectfully offered as proof that he has not been adequately remunerated for his time, ingenuity, and expense bestowed upon this invention, and the introduction thereof into use.

Respectfully submitted.

A. B., *Executrix.*

[Here follows oath. See Form 25.]

46. *Reasons of Opposition to an Extension (by Individuals).*

In the matter of the application of A. B. for an extension of letters-patent for improvements in sewing-machines, No. 12213, dated May 15, 1855.

To the Commissioner of Patents:

We wish to oppose the application above referred to, for the following reasons, viz.:

First. Applicant was not the original and first inventor of the improvement claimed by him in said letters-patent, the same having been fully described in the English patent No. 27, of the year 1853.

Second. If said alleged invention was ever made by applicant, which we deny, it is not *useful.*

Third. Said invention is not *valuable* and *important* to the public.

Fourth. Applicant has been *adequately remunerated* for his time, ingenuity, and expense in originating and perfecting his alleged invention.

Fifth. Applicant has not used due diligence in introducing his alleged invention into general use.

Sixth. Applicant has assigned to other parties all interest in the extension; and the extension, if granted, would not be for his benefit.

(See assignment to C. D., dated April 1, 1864; recorded June 2, 1864, in liber J[10], page 217.)

Seventh. The statement and account filed by applicant do not present a true statement of his receipts and expenditures.

E. F.
G. H.
I. K.

DEPOSITIONS.

47. *Notice of taking Testimony.*

BOSTON, MASSACHUSETTS, *March* 29, 1869.

In the matter of the interference between the application of A. B. for a paper-collar machine, and the patent No. 85038 granted December 15, 1868, to C. D., now pending before the Commissioner of Patents.

SIR: You are hereby notified that on Wednesday, March 31, 1869, at the office of E. F., Esq., No. 30 Court street, Boston, Massachusetts, at nine o'clock in the forenoon, I shall proceed to take the testimony of G. H., J. K., and L. M., all of Boston, as witnesses in my behalf.

The examination will continue from day to day until completed. You are invited to attend and cross-examine.

A. B.,
By R. Q., *his Attorney.*

——— ———, *Providence, Rhode Island.*

Proof of Service.

STATE OF ———, *County of* ———, *ss:*

Personally appeared before me, a justice of the peace, the above-named A. B., who, being duly sworn, deposes and says that he served the above notice upon O. P., the attorney of the said C. D., at one o'clock P. M. of the 30th day of March, 1869, by leaving a copy at his office in Providence, Rhode Island, in charge of his partner, R. S.

A. B.

Sworn to and subscribed before me this 31st day of March, 1869.

E. F.

(Service may be acknowledged by the party upon whom it is made as follows: —

Service of the above notice acknowledged.

C. D.,
By E. F., *his Attorney.*)

48. *Form of Deposition.*

Before the Commissioner of Patents, in the matter of the interference between the application of A. B., for a paper-collar machine, and the Letters-Patent No. 85038, granted December 15, 1868, to C. D.

Depositions of witnesses examined on behalf of A. B., pursuant to the annexed notice, at the office of E. F., No. 30 Court Street, Boston, Massachusetts, on Wednesday, March 31, 1869. Present, S. T., Esq., on behalf of A. B., and V. W., Esq., on behalf of C. D.

G. H. (1.)

G. H., being duly sworn (or affirmed), doth depose and say, in answer to interrogatories proposed to him by S. T., Esq., counsel for A. B., as follows, to wit: —

Question 1. What is your name, age, residence, and occupation?

Answer 1. My name is G. H.; I am forty-three years of age; I am a manufacturer of paper collars, and reside in Chelsea, Massachusetts.

Question 2, etc. . . . .

And in answer to cross-interrogatories proposed to him by V. W., Esq., counsel for C. D., he saith:

Cross-question 1. How long have you known A. B.?

Answer 1. . . . .

G. H.

49. *Certificate of Officer.*

[To follow deposition.]

STATE OF ———, } *ss:*
County of ———, }

At Boston, in said county, on the 31st day of March, A. D. 1869, before me personally appeared the above-named G. H., and made oath that the foregoing deposition, by him subscribed, contains the truth, the whole truth, and nothing but the truth. The said deposition is taken at the request of A. B., at the time and place named in the notice hereto attached, to be used upon the hearing of an interference between the claims of the said A. B. and those of C. D., before the Commissioner of Patents, on the 3d day of May, A. D. 1869.

The said C. D. was duly notified, as appears by the original notice, hereto annexed, and attended by V. W., Esq., his counsel.

E. F.,
Justice of the Peace.

The magistrate shall then append to the deposition the notice under which it was taken, shall seal up the testimony and direct it to the Commissioner of Patents, placing upon the envelope a certificate, in substance as follows: —

I hereby certify that the within deposition of G. H. [if the package contains more than one deposition, give all the names],

relating to the matter of interference between A. B. and C. D., was taken, sealed up, and addressed to the Commissioner of Patents by me this 26th day of April, A. D. 1869.

E. F.
Justice of the Peace.

50. *Application for Registration of a Label.*
[For an Individual.]

To the Commissioner of Patents:
The undersigned, John Fisher, of the city of Brooklyn, county of Kings, and State of New York, and a citizen of the U. States [or resident therein, as the case may be], hereby furnishes five copies of a print [*or* " *label,*" *as the case may be*], of which he is the sole proprietor.
The said print [or " label "] consists of the words and figures as follows, to wit: [Description and statement of articles on which used.]
And he hereby requests that the said print be registered in the Patent Office, in accordance with the acts of Congress to that effect.
BROOKLYN, N. Y., August 1, 1874.

——— ———,
Proprietor.

51.
[For a Corporation.]

The applicant, a corporation created by authority of the laws of the State of New York [or other authority, as the case may be], and doing business in said State, hereby furnishes five copies of a label [or " print," *as the case may be*], of which it is the sole proprietor.
The said label consists of the words and figures as follows, to wit: [Description.]
And it is hereby requested that the said label be registered in the Patent Office, in accordance with the acts of Congress to that effect.
Witness the seal of the said corporation at ———, ———, 1874.
[SEAL.]
——— ———,
President [*or other officer*].

Patents in European Countries.

Austro-Hungarian Empire. Patents are granted to natives or foreigners for 15 years; but the taxes, amounting to $341, can be paid in 3 instalments, as follows: for the first five years, $48.72; for the second five, $97.44; for the third five, $194.88. The application must be accompanied by models and drawings when practicable, and in all cases by a plain and full description which, when requested, can be kept from the knowledge of the public. A patent for foreign invention is only granted to the foreign patentee or his assignee. A patent becomes void if not used during the first year from the date of its issue, or if, after having been first used, two consecutive years are left to pass without any use being made of it.

Belgium. Patents are granted for 20 years, on application and without examination. The taxes are paid in annual and regular progressive instalments, beginning with $1.90, $2.80 for the second year, $5.70 for the third, etc. If not used in Belgium within a year from the day of its introduction in a foreign country, without satisfactory justification, the patent is annulled.

Denmark. Patents are granted for 3, 4, 5, 10, or 15 years; but foreign inventions are only protected for 5 years. The tax is small.

France. Patents [Fr. *brevets d'invention*] are granted to natives and foreigners with equal rights, for 5, 10, or 15 years S. G. D. G. — literally without guaranty of the government — which is to say that the validity of patents is left at the risk of the patentees. To be patented, however, an invention must be new and applicable to industry. What we call patent medicines, and pharmaceutical preparations generally, cannot be patented, but they can be effectually protected under the trade-mark law. The patent tax is 500, 1,000, or 1,500 francs, according to duration; it can be paid cash, or in annual uniform instalments of 100 francs ($19.30). If an instalment is left unpaid when due, the patent is annulled. A patent is also forfeited when left unworked for two consecutive years. A patent for an invention already patented abroad expires with the foreign patent. New patents can be taken out for alterations, improvements, or additions to the original invention; the same can be protected during the duration of the first patent, by a certificate which costs only 20 francs ($3.86).

Germany. To the present day there is no general patent law in Germany, and an invention, even if patented in all the small kingdoms, principalities, and duchies of the empire, is not effectually patented; the patent law of Prussia, for instance, providing that the patentee cannot prohibit the sale or importation of an article which is *like* that for which the patent is granted. In Prussia, besides, an American citizen may obtain a patent only through a Prussian representative, in whose name the patent is issued; and as any person whatever may obtain a patent for an invention patented abroad, but not yet published, it is almost useless to make application for a patent, if said application is not made simultaneously with that at home. Though the Prussian tax is almost nominal, the annual average of patents granted there is under 100. The patent law of Bavaria secures better protection to foreign inventions. Patents are granted for 15 years, and the tax, which is annual and progressive, begins with $10.41 for the first year, and finishes with $114.54 for the 15th year.

Great Britain. Patents are limited to the term of 14 years, which, however, can be extended, in certain cases, for an additional term of 7 or 14 years, by petition to the Queen in Council. Persons applying for letters-patent present petitions to the Patent Commissioners, accompanied by a declaration and a provisional specification. The object of the latter is to state distinctly the nature of the invention; and if properly made, it secures the inventor in his invention for a period of 6 months, when he may proceed to apply for and take out letters-patent. The application for the letters must be advertised in the *Gazette.* Parties who suppose they have a right to object to the letters-patent being issued, may then, if they think fit, come forward; and their objections being heard and decided upon, the letters are either granted or refused. Formerly letters-patent had to be separately taken out for England, Scotland, and Ireland. Now, however, the same patent serves for the whole United Kingdom. The *novelty* and *utility* of the invention are essential to the validity of a patent; if it can be shown to have been in use previously to the grant of the patent, or to be of no utility, it will be void. It must also be for something vendible, — something "material and useful made by the hands of man." A philosophical principle only, neither organized, nor capable of being so, is no ground for a patent; because it is an element and rudiment of science, and which, till applied to some new production from these elements, cannot, with justice to other inventors, be applied to the exclusive use of any one of them. A patent for a machine, each part of which was in use before, but in which the *combination* of the different parts is *new*, and a *new result* is obtained, is valid. But, in order to its being valid, the specification must clearly express that it is in respect of such new combination or application, and of that only; and not lay claim to original invention in the use of the materials. A patent may be granted for an addition to an old invention. But the patent must be *confined to the addition* or improvement, that the public may pur-

chase it without being encumbered with other things. If the patent include the whole, it will be void; for the property in the addition or improvement can give no right to the thing that has been improved. A valid patent may be obtained for an invention *new in the United Kingdom*, though it may have been previously practised in a foreign country. A patent is void, if it be for several distinct inventions, and *any one of them* fail of originality. The specification must be prepared with *great care*. It should set forth the invention fully and correctly. The terms used must be clear and unambiguous; no necessary description must be omitted nor what is unnecessary be introduced; and the invention must be described in the *best and most improved state* known to the inventor. If any one of these conditions be not complied with, the patent will be void. Any inaccurate or defective statement, were it even inserted through inadvertency, will vitiate the whole. An injunction may be obtained for the infringement of a patent, in the same way as for a violation of the Copyright Acts. The schedule of fees formerly charged on applying for or taking out letters-patent has been repealed, and the following stamp duties have been imposed in their stead: —

	£	*s.*	*d.*
On petition for grant of letters-patent..............	5	0	0
On certificate of record of notice to proceed........	5	0	0
On warrant of law officer for letters-patent.........	5	0	0
On the sealing of letters-patent....................	5	0	0
On specification................................ ...	5	0	0
On the letters-patent, or a duplicate thereof, before the expiration of the third year.................	50	0	0
On the letters-patent, or a duplicate thereof, before the expiration of the seventh year...............	100	0	0

Greece. There is no patent system. Monopolies are granted by special laws.

Italy. The patent law and tax are identical with those of France.

Russia. Patents are granted for 3, 5, or 10 years, and the tax for a 10 years' patent is $357. Any person introducing an invention patented in a foreign country may receive a patent, but it will not continue longer than the foreign patent, and in no case longer than 6 years. The term may, however, be extended to 10 years if the application is made by the inventor himself.

Patent-Agent, a person who acts for inventors and patentees; making searches, enrolling their designs, etc., at the patent office, and securing their rights at home or abroad.

Patentee, one who holds a patent right.

Patent Leather. See LEATHER.

Patent Medicine, a secret nostrum, pills, draught, or ointment, etc., these articles requiring to bear a government stamp. See MEDICINE.

Patent Office, the government office where patents are enrolled, and privileges obtained upon payment of certain fees. See PATENT.

Patissier, a French pastry-cook.

Patras. See GREECE.

Patrol, a mounted policeman; a watchman who goes his rounds.

Patron, a protector. In France, the master of a passage boat; a pattern or model.

Patronage, custom; favor; support.

Patten, a clog of wood standing on a ring of iron, worn to elevate the feet from the wet. — A socket for a column.

Pattern, a model to be copied; needle-work or lace-work marked out to be executed by the needle; a design submitted for imitation; a specimen or sample of commodity, transmitted by manufacturers to their correspondents, or carried from town to town by travelers, in search of orders; a sample.

Pattern-Book, a book with designs for selection.

Pattern-Card, a set of samples or pieces.

Pattern-Maker, PATTERN-READER, one who arranges textile patterns for weaving.

Pattern-Moulder, a designer and maker of models for cast-iron foundries.

Pattern-Setter, a workman who decides on the manner in which a lace or other pattern, which has been designed and stamped, is to be embroidered or filled up.

Patty-Pan, a small shallow tin vessel for baking patties in.

Paunch, on shipboard, a thick mat or ropeyarn placed in the slings of a yard or elsewhere, to prevent chafing.

Pave, to cover or floor with stone or brick.

Pavement, the hard covering of the surface of a road or foot-way.

Pavilion, a large park or lawn tent. — A summer house. — A Dutch boat. — Among jewelers, the under side and corner of brilliants, lying between the girdle and collet.

Pavior, a workman who lays stones and bricks in streets and yards, etc.

Pawl, a short bar of iron which prevents the capstan, windlass, or similar machinery from turning back.

Pawn, or PLEDGE, is a contract by which a lender, or other creditor, is put in possession of some article of moveable property, which he retains as a security for the payment of a debt. The person who gives the pledge is called the *pawner*, and the person who receives it the *pawnee*. The contract is one of those bailments to which the rules of careful custody apply, and the pawnee is held responsible for *ordinary* care of the pledge deposited with him. If, being of a perishable character, it perish in the course of nature, he is not responsible, and may recover his money. If it is of a nature to be deteriorated by use, as wearing apparel, he is not entitled to the use of it. In the case of an animal which is not deteriorated by use, and the cessation to employ which is a loss of valuable services, — as in the case of a horse or a dog, — it is an understood part of the contract that the pawnee has the use of the pledge. Where there is neither advantage nor disadvantage to the article in using it, — as in the case of jewelry, — it would appear that the pawnee may use the pledge, but that he is absolutely responsible for all damage or loss that may arise from the use. He must give up the pledge on a tender of the debt, and, unless by special contract, there is no time when the pledger cannot redeem. — The distinction between a pawn and mortgage of chattels is equally well settled in the English and American law; and a mortgage of goods differs from a pledge and pawn in this, that the former is a conveyance of the title upon condition, and it becomes an absolute interest at law, if not redeemed by a given time, and it may be valid in certain cases without actual delivery. See PAWNBROKER.

Pawnbroker, a species of banker, who advances money, at a certain rate of interest, upon security of goods deposited in his hands; having power to sell the goods, if the principal sum and the interest thereon be not paid within a specified time. The practice of impledging or pawning goods, in order to raise loans, is one that must necessarily always exist in civilized societies, and is, in many cases, productive of advantage to the parties. But it is a practice that is extremely liable to abuse. By far the largest proportion of the *bona*

fide borrowers of money on pawn consist of the lowest and most indigent classes; and were the lenders not subjected to any species of regulation, advantage might be taken (as, indeed, it is occasionally taken, in despite of every precaution) of their necessities to subject them to the most grievous extortion. But besides those whose wants compel them to resort to *P.*, there is another class who have recourse to them in order to get rid of the property they have unlawfully acquired. Not only, therefore, are *P.* instrumental in relieving the pressing and urgent necessities of the poor, but they may also, even without intending it, become the most efficient allies of thieves and swindlers, by affording them ready and convenient outlets for the disposal of their ill-gotten gains. The policy of giving legislative protection to a business so liable to abuse, has been doubted by many. But though it were suppressed by law, it would always really exist. An individual possessed of property which he may neither be able nor willing to dispose of, may be reduced to a state of extreme difficulty; and in such case, what can be more convenient or advantageous for him than to get a loan upon a deposit of such property, under condition that if he repay the loan, and the interest upon it, within a certain period, the property will be returned? It is said, indeed, that the facilities of raising money in this way foster habits of imprudence; that the first resort for aid to a *P.* always leads to a second, and that it is impossible so to regulate the business, as to prevent the ignorant and necessitous from being plundered. That this statement, though exaggerated, is, to a certain extent, true, no one can deny. On the other hand, however, the capacity of obtaining supplies on deposits of goods by affording the means of meeting pressing exigencies, in so far tends to prevent crime, and to promote the security of property; and it would seem as if the desire to redeem property in pawn would be one of the most powerful motives to industry and economy. At the same time, too, it must be borne in mind, that it is not possible, do what you will, to prevent those who are poor and uninstructed from borrowing; and that they must, in all cases, obtain loans at a great sacrifice, and be liable to be imposed upon. But the fair presumption is, that there is less chance of any improper advantage being taken of them by licensed *P.* than by a private and irresponsible individual. Although, however, the business had all the inconveniences, without any portion whatever of the good which belongs to it, it would be to no purpose to attempt its suppression. It is visionary to imagine that those who have property will submit to be reduced to the extremity of want, without endeavoring to raise money upon it. Any attempt to put down pawnbroking would merely drive respectable persons from the trade, and throw it entirely into the hands of those who have neither property nor character to lose. And hence the object of a wise Legislature ought not to be to abolish what must always exist, but to endeavor, so far at least as is possible, to free it from abuse, by enacting such regulations as may appear to be best calculated to protect the ignorant and the unwary from becoming the prey of swindlers, and to facilitate the discovery of stolen property. For this purpose it seems indispensable that the interest charged by *P.* should be limited; that they should be obliged to give a receipt for the articles pledged, and to retain them for a reasonable time before selling them; that the sale, when it does take place, should be by public auction, or in such a way as may give the articles the best chance for being sold at a fair price; and that the excess of price, if there be any, after deducting the amount advanced, and the interest and expenses of sale, should be paid over to the original owner of the goods. To prevent *P.* from becoming the receivers of stolen goods, they should be liable to penalties for making advances to any individual unable to give a satisfactory account of the mode in which he became possessed of the property he is desirous to pawn; the officers of police should at all times have free access to their premises; and they should be obliged carefully to describe and advertise the property they offer for sale.

Pay, salary or wages earned; hire. — To give what is due, to discharge a debt.

Payable, that is, justly due or legally enforceable; that becomes due on a day certain, as a bill *payable*.

Pay-Bill, a list of persons to be paid.

Pay-Day, the day fixed for payments to be made; or when wages or salary is received. On the Stock Exchange, the last day for closing and settling a stock or share account, usually the fifteenth and thirtieth day of the month.

Payee, the party to whom a bill or note is payable.

Payer, one on whom a bill or note is drawn, and by whom the money is paid.

Payment, act of paying or making compensation. —The thing given in discharge of a debt, or fulfilment of a promise or obligation.

Pea [Fr. *pois;* Ger. *erbs;* It. *pisello, biso;* Sp. *pesole, guisante*], one of the most esteemed of the leguminous or pulse plants. There are many varieties, but the common garden *P.*, *Pisum sativum*, and the common gray or field *P.*, *Pisum arvense*, are the most generally cultivated. The common garden *P.* is by far the best known of all peas; its seeds are eaten green or unripe. They were formerly largely imported from France, put up in sealed tin cans, but American canned peas now favorably compare with French preserves. The cultivation of the *P.* as a field crop is principally confined to the Middle, Eastern, and Western States, the varieties of which are distinguished as the early and the late ripening. The early varieties are generally small and dark-colored, among which the gray and grass are the most common. The yield varies from 25 to 40 bushels per acre, weighing 64 lbs. to the bushel. The marrow-fats are among the richest of the field peas, which are much preferred for good lands. The small yellow are thought to be best for poorer soils. A very prolific "bush *P.*" is cultivated in the S. States, bearing pods six or seven inches in length, which hang in clusters, and are filled with fine white peas, much esteemed for the table, either green or dry. Considerable quantities of the finer sorts of peas are imported from England and France for seeds.

Imp. duty: for domestic purposes, 10 per cent; for seed, 20 per cent; split peas, 20 per cent.

Peaberry. See Coffee.

Peabody Rifle. See Gun.

Peach [Fr. *pêche*], a choice fruit, the produce of *Amygdalus communis* (see Fig. 211), of which there are more than 200 cultivated varieties. The wood of the *P.*-tree is hard, compact, of a roseate hue, and is susceptible of a fine polish; but owing to its inferior size, it is but little used in the arts. Its leaves yield, by distillation, a volatile oil of a yellow color, containing hydrocyanic acid. Its bark, blossoms, and kernels of the fruit, also possess the same poisonous property. From the quantity of

gum and sugar contained in the delicious pulp, the peach is nutritious, and is employed as a dessert, both fresh and preserved. From the malic acid contained in its juice, it is slightly refrigerant, and if eaten in moderate quantities it is generally considered as wholesome; but if taken too freely it is liable to disorder the bowels. When stewed with sugar, it may be given as a mild relaxative to convalescents. The kernels may be used for the same purpose as those of the bitter almond. The leaves are sometimes employed by the cook, the liquorist, and the confectioner, for flavoring, and they have also been substituted for Chinese tea; but, as fatal consequences have sometimes followed these uses, they should be looked upon with precaution. The *P.* was introduced into N. America by the first European settlers, and several sections of the U. States are justly noted for its cultivation and production. It is nowhere so largely cultivated as in this country, which is said to be the only one in which this delicious fruit is within the reach of all classes. In New Jersey, Delaware, and Maryland the cultivation of the *P.* has been for years a valuable industry, and has given this section the name of the *P.* garden of the continent. In these States are many orchards counting 10,000, 20,000, aud 30,000 trees, yielding an annual crop of immense value. On one farm in Maryland of 1,350 acres there are 136,000 trees. The peninsula of Delaware and Maryland, in ordinary good seasons, sends to market from 7,000,000 to 8,000,000 baskets of peaches, amounting in value to $1,500,-000. Another important *P.* district is on the lake shore of Michigan, which, though so far north, has its climate modified by the proximity of large bodies of water. This region produces profitable crops, estimated at $1,000,000 in value annually, which find their market in Detroit, Chicago, and other western cities. One grower in Michigan sells his *P.* crop from an orchard of 12 acres for $12,000 per annum. Ohio, Illinois, Indiana, Missouri, and Kentucky also produce large quantities of this fruit. In several of the S. States, Tennessee, Georgia, Texas, etc., *P.*-growing is receiving careful attention, and profitable crops of excellent varieties are the result. In California the production is very large. — The canning of *P.* forms now a considerable branch of our national industry, and the canned fruit of Baltimore and New York is exported to almost all countries. The estimated annual *P.* crop of the U. States is valued at $56,135,000.

Manuf. "The process of preserving peaches is very simple; the cans are rapidly made by machinery, and have a circular opening at one end for the admission of fruit; the peaches, peeled and halved by hand, are thrown into a hopper from which a spout leads to the floor below; the cans are placed under this spout, and by aid of the fingers rapidly filled; a weak sirup is run into the can to fill all the interstices; then it goes to the solderer, who puts on the circular cover; this has a small hole pricked in it to allow of the escape of the air which is expanded by the heat of the soldering iron; when the edge of the cover is secured, this hole is closed by a touch of solder; a large number of cans are placed on an iron grating and lowered into a vat of water at the bottom of which is a coil of pipe; high-pressure steam is let into this coil, and as the cans heat they are closely watched; if air bubbles are seen to be given off by a can, that is removed as imperfect; the water is raised to boiling, and the cans remain until their contents are heated to this temperature quite through. Considerable quantities of fruit are dried in various parts of the country by simply exposing it in slices to the heat of the sun; such fruit is always dark colored, and greatly inferior to that prepared in the several patented kinds of drying apparatus, where artificial heat removes the moisture in a few hours. In some orchards the soft and inferior fruit has the juice pressed from it, fermented, and distilled to produce *peach brandy*; the present excise laws have greatly diminished this manufacture." *The American Cyclopædia.*

Peach-Wood. See NICARAGUA-WOOD.

Peacock, a well-known domestic fowl, the *Pavo cristatus*, which has a beautiful spreading tail. The ocellated feathers are esteemed in the East, being worn by the Chinese mandarins in their caps, and made into fly-floppers, fans, and other ornaments in India.

Pea-Jacket, a loose, warm short-coat, made of rough pilot cloth for use at sea.

Peak, the pointed bill of the palm of an anchor.—The upper corner of a sprit-sail.—The leather front of a cap. — A name for the great Constantinople foot = 0.73172 yard.

Pea-Meal, ground pease, used for soups.

Peanut, GROUND-NUT, a low, creeping plant, *Arachis hypogæa* (Fig. 390), having the appearance of a dwarf garden pea, although more bushy. After the flowers drop off, and the pods begin to form, the stalk or support of the pod elongates, thrusting the pod under ground, where it comes to maturity. The seeds are roasted in the pod, and are sold in large quantities in this country, being a favorite dainty with children. This plant is very prolific, and, in warm climates, requires but little care and attention in its culture. It is extensively cultivated in the Southern States, its crop being regarded more profitable than cotton or tobacco. There are two varieties, the Virginia, which is the larger, and the Carolina or African. *Imp.* duty: 1 ct. per lb.

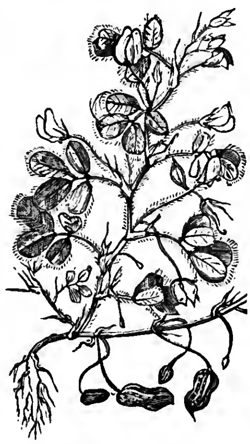

Fig. 390. — PEANUT.

The *P.* seeds are among the best known as oil-producers, yielding from 40 to 45 per cent of oil, which is not inferior to that obtained from the olive as regards quality, and is good for every purpose for which olive oil is used. It is a good lamp oil, burning with little smoke, a clear flame and affords a very full, bright light. It is one of the best lubricating oils for machinery: and for all alimentary purposes it is equal to the best olive oil, and it is said to be largely substituted for that article in commerce. Many thousand tons of the nuts are annually imported into France from Africa for the purpose of expressing the oil, which is extensively used in Marseilles in the manufacture of soap, and also, it is stated, finds its way into the trade under the name of olive oil. The ground-nut is grown in immense quantities in the East India Islands and along the African coast, mainly for the sake of its oil. In Java and Malacca it is known as katjang oil. Another use made of the nuts (which is said to be increasing) is that of grinding them up for mixing with cacao in the preparation of chocolate, and it is freely asserted that in the manufacture of the latter, where the ground-nut is easily procured, the cacao is entirely omitted in the preparation of so-called chocolate condiments.

Pear, the well-known fruit of *Pyrus communis*. The varieties of this tree cultivated for their fruit, of which there are between 600 and 700, succeed both in the temperate and transition zones of the two hemispheres, and it has been remarked that this tree, as well as the apple and the cherry, will grow in the open air wherever the oak will thrive.

The wood of the common pear-tree is heavy, strong, compact, of a fine grain, and slightly tinged with red. In common with that of all the *Rosaceæ*, it is liable to have its natural color changed by steeping in water, which, therefore, ought to be avoided when intended for particular purposes in

the arts. When green, it weighs nearly 80 lbs. to a cubic foot, and from 49 to 53 lbs. when dry. It is, next to the true service (*Pyrus sorbus*), the best wood that can be employed in wood engraving, for which purpose, however, it is far inferior to that of the box. Yet it is allowed to be very hard and homogeneous, easy to cut, and, when perfectly dry, is not liable either to crack or warp. For the coarser kinds of engraving, such as large plans or diagrams, show-bills, etc., it serves a very good purpose. When it can be obtained, in Europe, it is much used by turners and pattern-makers; also for joiners' tools; and as it can readily be stained, it is sometimes made into various articles, dyed black, in imitation of ebony. But the most important uses of the pear-tree are those which arise from its fruit. When ripe, it is employed at the table as dessert, either raw, stewed, or preserved in sirup, and occasionally it is used in tarts. In most of the countries where it grows this fruit is very generally dried in ovens, or in the sun, in which state, when stewed, it is excellent, either as a substitute for puddings and pies, or as forming part of the dessert. Another purpose to which the pear is applied is for making *perry*. It is extensively cultivated for this object in various parts of Britain, France, and Germany, where the trees are sometimes planted in rows 18 or 20 yds. apart in order to admit a free access of light and air. Perry is made in the same manner as cider. The pears should be gathered before they begin to fall, and should be ground as soon after as possible. Should the perry not be sufficiently clean when racked off, it may be fined in the usual manner of clarifying cider, by isinglass, in the proportion of about half an ounce to a barrel. The kinds of pear used for making this liquor are such as have an austere juice. Pears that are to be kept for winter use should hang as long on the trees as the state of the weather will admit. They should then be kept in heaps, in an open, dry situation, for about ten days, then wiped with a dry woolen cloth, and, lastly, packed up close from the air and moisture. But to keep the fruit in its greatest perfection, small earthen jars may be selected about the size of the pear, which should be packed separately, in clean oat chaff or wheaten bran, then tied down with oiled paper or skin, and cemented tight with wax or pitch.

Pearl [Fr., Ger., It. *perle;* Sp. *perla*], a well-known globular concretion found in several species of shell-fish, but particularly the mother-of-pearl oyster (*Concha margaritifera*). *P.* should be chosen round, of a bright translucent silvery whiteness, free from stain and roughness. Having these qualities, the largest are of course the most valuable. The larger ones have frequently the shape of a pear; and when these are otherwise perfect, they are in great demand for earrings. *P.* were in the highest possible estimation in ancient Rome, and bore an enormous price. Their price in modern times has very much declined; partly, no doubt, from changes of manners and fashions; but, more probably, from the admirable imitations of *P.* that may be obtained at a very low price. The best imitations were first made by a French bead-maker named Jacquin. The water in which the fish called the bleak (*Cyprinus alburnus*) is washed, is filled with powdery particles, which shine with a pearly lustre. Jacquin noticed this; he called this powder "essence of pearl," or *essence d'orient*, and succeeded in covering the inside of glass beads with it, thus producing a most admirable spurious glass *P.*

A handsome necklace of Ceylon *P.*, smaller than a large pea, costs from $850 to $1500, but one of *P.* about the size of peppercorns may be had for $75: the *P.* in the former sell at $5 each, and those in the latter at about 35 cents. When the *P.* dwindle to the size of small shot they are denominated *seed P.*, and are of little value. They are mostly sent to China. A perfect white drop *P.* of 80 to 100 grains, is worth from $35 to $55 per grain; those of 50 to 80 grains from $20 to $35; those from 30 to 50 grains from $15 to $25; smaller sizes bringing from $5 to $15 per grain. Misshapen *P.*, called *barrok P.*, are worth from $50 to $1000 per ounce, depending on quality, color, and size. Pink *P.* are worth from 75 cents to $10 per grain. Black and lead-colored *P.* bring a large price, when they are of a fine shape and good color. Unbored *P.* are called *virgins*, worn ones *widows*. In drilling, a bow and steel are used with a very fine drill, the *P.* being held between two pieces of wood. It is said that the finest *P.* necklaces in existence are, those possessed by the ex-Empress of the French, and that presented to the Queen of Great Britain by the East India Company. Much difference of opinion has existed among naturalists with respect to the production of *P* in the oyster; but it seems now to be generally believed that it is the result of disease, and is formed in the same manner as bezoar; *P.*, like it, consisting of successive coats spread with perfect regularity round a foreign *nucleus*. In fact, the Chinese throw into a species of shell-fish (*Mytilus cygneus*, or swan muscle), when it opens, 5 or 6 very minute mother-of-pearl beads strung on a thread; and in the course of a year they are found covered with a pearly crust, which perfectly resembles the real *P.* The most valuable *P.* fisheries are those on the W. coast of Ceylon; at the Bahrein Islands in the Gulf of Persia; at Tuticoreen, on the coast of Coromandel; off St. Margarita, on Pearl Islands, in the West Indies; and in the Bay of Panama in the Pacific. Very large and beautiful *P.*, too, are said to have been found recently on the peninsula of California. The fisheries in the Persian Gulf are the most valuable, giving employment to 4000 boats, and about 30,000 people, yielding a reveuue of more than $1,800,000. *Imp.* duty: not set, 10 per cent; set, 25 per cent.—Imported strung on thread, to be used as beads without further manufacture, 50 per cent; if imported only for convenience of transportation, and to be set here, 10 per cent.—Composition, set, 30 per cent.—Imitation or mock *P.*, 40 per cent.—*P.* and *P.* shells, products of American fisheries, free.

Pearl, a size of printing-type between Diamond and Agate.

Pearl-Ash. See POTASH.

Pearled, having a border of lace.—Made in shape and appearance like pearls, as barley, sago, etc.

Pearl-Edge, a projection at the sides of ribbons, which is formed by making some of the threads of the weft project beyond the rest; also the name for a narrow kind of thread edging to be sewn to lace.

Pearl-Moss. See CARRAGEEN.

Pearl-Oyster. See PEARL.

Pearl-Powder, PEARL-WHITE. See BISMUTH.

Pearl-Shell. See MOTHER-OF-PEARL.

Pearl-Stringer, one who threads pearls, imitation or real, for necklaces or other ornaments.

Pearl-Weight. The troy ounce contains 600 pearl grains, and hence one pearl grain is $\frac{4}{5}$ of a troy grain.

Pease, PEAS, pl. of PEA. The plural form *pease* is used, more frequently in England than in this country, to indicate an indefinite number or quantity in bulk.

Peat, a substance composing the soil of bogs or swamps, and consisting of the twigs, leaves, and roots of trees, mixed with grass, plants, weeds, earth, etc., that have long lain in water, and thereby become decomposed into a blackish-brown mass that may be cut with a spade, and dried for fuel. Peat is found in bogs of considerable extent in the New England, in the N. W. States, in Canada, and in the northern part of New York. The dried kinds of peat are very serviceable as fuel in districts where coal is dear and wood scarce.

Peat-Reek, the smoke of peat, as communicated to Highland whiskey, distilled by means of peat.

Peaux-Brutes [Fr.], raw hides.

Pebbles, a name given to various ornamental

stones, worked by the lapidary, which, though differing much in color and appearance, may be regarded as varieties of agate. Lenses of spectacles are sometimes made of very clear rock crystal instead of glass, and then they are rather absurdly said to be pebble.

Pecan-Nut. See HICKORY.

Peck, a dry measure of 2 gallons, the fourth part of a bushel.

Pecul, PICUL, a Dutch measure of capacity, the principal heavy weight used in most of the markets of the Eastern archipelago. At Macao the Portuguese distinguish it into three kinds, viz: — the *P.* balanca of 100 catties = 133 lbs. 5 oz. 5.333 dwts. avoirdupois; the *P.* seda of from 111 to 115 catties = 148.2 lbs avoirdupois; the *P.* chapa of 150 catties = 200 lbs. avoirdupois· at Singapore, 16 *P.* and 80 catties make a ton, and 40 *P.* a coyan. Ninety catties seda = a Canton *P.*, or *P.* balanca. By the first, or *P.* balanca, are sold cotton, and valuable articles; by *P.* seda, alum, pepper, and coarse goods; and by the *P.* chapa, rice. — In Manila, the *P.* is 140 lbs.

Pedal, the lever of a harp, organ, or pianoforte, moved by the foot. When the foot-lever belongs to a loom or a lathe, it is called a treadle or treddle.

Peddle, to carry about goods for retail sale.

Pedestal, the foot or base of a column or statue.

Peddler, PEDLAR, PEDLER, one who carries about small commodities for sale. By the law of the U. States, peddlers must take out a license; and any person (except persons peddling only charcoal, newspapers, magazines, bibles, religious tracts, or the products of his farm or garden) who sells, or offers to sell, at retail, goods, wares, or other commodities, travelling from place to place in the town, or through the country, is regarded a peddler.

Pedometer, PERAMBULATOR, a distance-measurer, made in the form of a watch, by the use of which the number of steps or paces the wearer takes when walking may be ascertained. When affixed to a saddle, it indicates the number of paces the horse makes; and to a curricle, or other carriage, the number of the revolutions of the wheels

Pedreual, a kind of small firelock.

Peel, a baker's wooden slide with a long handle for putting loaves in the oven and taking them out. — A broad shovel. — A printer's tool for hanging up damp printed sheets on a line to dry. — The skin or rind of fruit. (See ORANGE.)

Peen, the sharp point of a mason's hammer.

Peg, a wooden nail. — A small marker for a cribbage-board. — A pin in a hat-rack. A large trade is carried on in the U. States in the manufacture of wooden pegs for shoes, quantities of which are shipped to England.

Pegged Boots, boots with wooden pegs in the soles, instead of stitches.

Pegola [It.], pitch, tar.

Peg-Top, a child's plaything for spinning, made of wood.

Peigne [Fr.], a comb. — A card or weaver's reed.

Peik, a long plummet, or piece of lead, used for ruling paper.

Peirameter, an instrument for measuring the amount of resistance to which carriages on roads of different construction are liable.

Pekin. See CHINA.

Pekoe, a fine black tea, so named.

Pelage, a wild beast's skin.

Pelerine, a lady's long cape, with ends.

Peletero [It.], a furrier.

Pelisse, a lady's silk cloak; a furred robe for men.

Pellitory, the *Anthemis byrethrum*, a plant cultivated in Germany for its root, which is used in medicine as a masticatory and stimulant. The root is without smell, and when dry it is some inches long, tough, fibrous, of the thickness of a quill, externally gray, internally white. *Imp.* free.

Peltries, PELTS, the commercial name for the dried but undressed skins of beasts with the hair on. When the inner side has been tanned they are denominated furs. (See FURS.)

Pemmican, among the N. American Indians, meat cut in long thin strips without fat, and dried in the sun; chargin. — Meat prepared by drying in the sun, pounded, and compressed into bags for use as an article of provision in long voyages, journeys, etc.

Pen, a shaped quill or metal instrument for writing with. (See GOLD PEN, QUILL PEN, and STEEL PEN.)

Pencil, a name applied to instruments for writing, drawing, or painting, differing as much in their construction as in the use to which they are applied. There are now in use the following kinds of *P.*: *hair-P.*, *lead-P.*, *chalk-P.*, *slate-P.* The first are used for painting or writing with fluid colors, either oil or water, and in China or Japan are employed almost entirely instead of pens for writing (see BRUSH). The well-known lead-*P.* is made by cutting black-lead, graphite, or plumbago (see PLUMBAGO) into thin plates with a saw, and again into strips as wide as the plate is thick. These strips are then laid in a groove in a piece of Florida cedar, upon which is glued another and thinner piece; the whole is afterwards rounded by a plane adapted to that purpose. Some *P.* are filled with colored chalk instead of black-lead. Slate-*P.*, for writing on slate, are made either by cutting slate into thin sticks, and rounding them, or by cutting it into fine square slips, and encasing them in wood, as in the case of black-lead. The *ever-pointed P.* is an instrument for using cylindrical pieces of black-lead, which are forced forward in the *P.* just so far as to allow them to be used without breaking. The leads are manufactured of different thickness, and the *P.*-cases are marked with a letter to correspond with the lead required for it. From the ever-pointed *P.*, invented in 1829, to the perfected *charm-P* of 1879, an endless variety of *P.*-cases have been introduced or invented in this country. The wonderful ingenuity spent in the manufacture of this small article of trade was evidenced by the Joseph Dixon Crucible Company's exhibit at the American Institute Fair, held at New York in 1879, which contained specimens of 1,103 different kinds of *P.* or *P.*-cases.

Lead-*P* are usually described as follows: first quality, or drawing *P*; second quality, or prepared *P.*; third quality, or composition *P.* — 1. *P.* of the *first* quality are, when genuine, made of pure lead of the Cumberland mines of England From 18 to 20 dozen *P* are produced from a pound of this lead. These *P.* are usually made by sawing the lead into the pieces inserted in the cedar Sometimes, however, the lead is in parts gritty and defective, so that a *P* of this kind may, in fact, be very inferior To obviate this defect, some makers prepare the lead, to free it from the grit or earthy particles; and, provided no antimony or other alloy be mixed up with the prepared lead, the *P* produced from it are most to be depended on — 2 *P.* of the *second* quality are manufactured out of the sawings or dust of pure lead, with the dust of the small pieces picked up by poor people from the rubbish thrown out of the mine, mixed or alloyed with a greater or less quantity of antimony The goodness of this *P.* depends, of course, on the proportion in which the pure lead exceeds the antimony This sort of composition produces about 15 or 16 dozen *P.* to the pound; their price varying according to the purity of the

lead. — 3. The *third* quality of *P.* is made by using Mexican or Spanish lead dust, with antimony. It produces about 14 or 15 dozen *P.* to the pound. This sort of *P.* may take a firm point, and make a fine stroke, but its trace will not obliterate on being rubbed with india-rubber. The easy and complete obliteration of the stroke is, in fact, the best and perhaps only test of a *P.* being of pure Cumberland lead. — Dixon's American graphite *P.* are in different styles, as *black*, *maroon*, *cedar-finish*, the latter being in the natural color of the cedar of which they are all made; *satin-finish*, a new style, is made of the same cedar, but finished to resemble French walnut in color, showing the grain of the wood. There are ten distinct grades of hardness in the leads, shown by the grade stamps, as follows: VVS, *very, very soft*, for the deepest heavy shading; VS, *very soft*, for very deep shading; S, *soft*, for rapid shading in sketching, the softest grade for office use; SM, *soft medium*, for general sketching, the popular grade for office or pocket; MB, *medium black*, for drawing or general use; M, *medium*, for office and stenographic, professional, or desk use; MH, *medium hard*, for finer desk use or fine lines in drawing; H, *hard*, for bank use or finer lines in drawing; VH, *very hard*, for architects, engineers, draftsmen, etc.; VVH, *very, very hard*, for the finest lines. The S, SM, M, H, and VH are the five regular office grades. The whole ten grades are for artists. The SM and M only are made in the round black *P.* with the gold stamp, and in the maroon finish both round and hexagon shapes. But the five regular office grades of leads are all made in round and hexagon shapes, in both the *cedar-finish* and the new *satin-finish*, and the whole ten distinct grades of lead are made of the hexagon shape only, both of these styles of finish for artists and technical uses.

Imp. duty: *P.* in wood filled with lead, chalk, or other material, 50 cts. per gross and 30 per cent. — Lead-*P.*, not in wood, $1 per gross. — Slate-*P.*, 40 per cent. — Hair-*P.*, 35 per cent. — *P.*-cases (gold, silver, or German silver), 40 per cent; plated or gilt, 35 per cent.

Pendant, a hanging burner for gas.

Pendulum, Pendule, a swinging-weight or time-regulator to a clock (see Fig. 391). When a *P.* of given length, say exactly 1 yard, is set swinging, its swing is performed in just the same *time*, whether made large or small in extent. If its path is longer, it travels more swiftly; if shorter, it travels less swiftly; the equality is not mathematically equal, but for all practical purposes the duration of the swing is equal until the *P.* stops altogether. Galileo discovered this isochronism in 1581; and he soon afterwards applied it as a time-measurer. Every shortening of the *P.* itself shortens the time in which each swing is made; and there is thus afforded a means of dividing an hour into any number of minute parts. Huyghens, Hooke, and Harris all greatly advanced the practical application of Galileo's discovery, especially in making the swing or path of the *P.* very short, which causes the isochronism to be more nearly perfect. In 1715 Graham began the practice of enabling clocks to correct their own errors due to changes of temperature. When the weather gets warmer, a *P.* lengthens a little, and, by thus lengthening, swings more slowly. Hence the strict isochronism depends on equability of temperature. Graham invented a beautiful *compensation P.* for self-regulation in this matter. He used a vessel of mercury for a bob or ball (Fig. 391). When increasing warmth lengthens the *P. downwards*, it also increases the height of the mercurial column *upwards*; and he caused these two opposite tendencies to balance each other. Harrison, in 1767, produced a still more perfect compensation or automatic adjustment by making a sort of gridiron of different metals (see Fig. 391). Some metals elongate more than others with a given increase of heat, and Harrison so contrived that these inequalities should produce a compensating result. Numerous other modes have been devised for correcting for variations of temperature. See Clock.

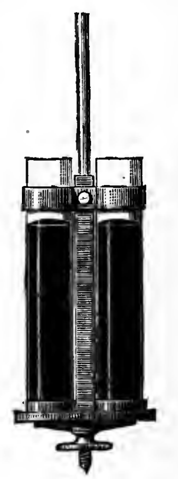

Fig. 391.
Compensation Pendulum.

Penguin, a sea-fowl exclusively found in the Antarctic seas, deriving its name from its penguidity or excessive fatness. The skin of the breast of some species is used for making muffs, and other articles of ladies' dress.

Pen-Holder, a handle, holdfast, or support for a steel pen, made of different materials.

Penitentiary, a house of correction for criminals.

Pen-Knife, a small sharp knife for shaping quills into pens.

Penner, a workman on sewed muslins.

Pennistone, a coarse woollen frieze.

Penn Mutual Life-Insurance Co., located in Philadelphia, Pa., organized in 1847. *Statement*, Jan. 1, 1880: Assets, $7,006,306; liabilities, $5,517,171. New policies, 1,732, amounting to $4,027,139. Policies in force, 11,189, amounting to $29,678,033; premiums, $1,039,041; dividends paid to policy holders, $865,531.

Pennsylvania, one of the central U. States, bounded N. by Lake Erie and New York; E. by New York and New Jersey; S. by Delaware, Maryland, and West Virginia; and W. by West Virginia. It lies between lat. 39° 40′ and 40° N., lon. 74° 40′ and 80° 40′ W. Its greatest length is 303 m., maximum breadth, 176 m.; area, 46,010 sq. m. *P.* is divided into 66 counties. Its capital is *Harrisburg*, an important manufacturing city, pleasantly situated on the E. bank of the Susquehanna River, 106 m. W. by N. of Philadelphia. Pop. 30,000. The largest city is Philadelphia, which in the American Union is only second to New York in population, wealth, and commercial importance (see Philadelphia). The other cities of *P.* are Allentown (pop. 15,000), Altoona (12,000), Carbondale (8,000), Chester (23,000), Columbia (8,000), Corry (7,500), Erie, a port of entry (see Erie), Franklin (4,500), Lancaster (25,000), Lock Haven (9,000), Meadville (8,500), Pittsburgh, a port of delivery (see Pittsburgh), Reading (43,000), Scranton (40,000), Titusville (10,000), Williamsport (20,000), and York (15,000). Total pop. of the State, about 4,200,000.

The surface of the State is level in the S. E., hilly and mountainous in the interior, and generally level or arable in the W. The Alleghany Mountains occupy all the central part, covering, with their ramifications, more than half its area. These ridgy tracts all tend N. E. and S. W., those E. of the Alleghany range being abrupt and precipitous, while W. the surface declines toward the Ohio River and Lake Erie in graded slopes. The passes of this inner range are about 2,000 ft. above sea-level, the lower valleys of the Ohio where it leaves the State, and the plain skirting Lake Erie, being about 800 and 650 ft. respectively. The inner valley by which the Susquehanna flows has but an inferior elevation above the sea, and it takes up a large area, dividing the mountainous belt. The mountains of *P.* are components of the great Appalachian chain, and form a succession of ridges, running in parallels, generally in a direction S. W. to N. E., and presenting in some parts summits elevated 3,000 ft. The principal valleys of the mountain region are those of Chester, Wyoming, Lackawanna, Juniata, Cumberland, and Monongahela. The chief rivers are the Susquehanna, traversing the centre of the State, and the largest stream flowing into the Atlantic in the U. States; the Delaware, with its affluents, the Lehigh and Schuylkill; the Juniata, tributary to the Susquehanna; and, in the W., the Alleghany and Monongahela, uniting at Pittsburgh to form the Ohio. In the N. W., Lake Erie borders on the State a distance of 45 m. — The climate is changeable, though, upon the whole, one of the most agreeable and temperate in the Union. The season of frost and snow seldom exceeds three months, the winter commencing about the first two weeks of Dec., and terminating from the 1st to the 15th of March. The heat of summer is seldom op-

pressive, except in low situations. Near the sea-coast the temperature of winter is severe, varying in the months of Jan. and Feb. from 14° to 28° F. — The soil in the E. part of the State is partly light and sandy, but in the interior plains and valleys it is a deep, rich loam; there are few absolutely sterile tracks, and, in general, this is one of the most productive parts of the Union, yielding most of the finer fruits of temperate climates in the greatest luxuriance. Almost every kind of grain is raised, but wheat is the staple, and *P.* may be said to be, emphatically, a wheat-growing country. — *P.* is rich in mineral wealth, possessing vast quantities of coal, iron, and salt. Anthracite coal is found E. of the Alleghanies, in fields extending altogether over a vast area (see COAL). Bituminous coal is found nearly everywhere W. of the mountains, and large quantities are consumed at Pittsburgh and Cincinnati, in the smelting of iron. The area of this coal-field embraces nearly 13,000 sq. m., and extends through 24 counties, and is estimated to yield 6,500,000 tons (see COAL). *P.* enjoys a wider reputation as an iron-producing community than any other State in the Union. This is more the result of the thorough development and skilful use of such ores that exist, than of any advantages in the quantity or quality of the ferruginous deposits. The States of New York, New Jersey, and Virginia are far more liberally endowed by nature in this respect; each contains more iron ore than *P.* Nevertheless, this State produces more manufactured iron than all the other States combined. *P.* is the great petroleum State, and its production of the illuminating material of the world is the third industry in the State (see PETROLEUM). Salt is obtained from springs to the amount of about 1,700,000 bushels yearly. Marble, limestone, copper, zinc, etc., are also met with. — Most branches of agricultural industry are in a comparatively advanced state. Horses and cattle, especially the former, are particularly good; and this is, next to New York, the principal wool-growing E. State of the Union. The number of farms in *P.* under cultivation, as reported by the last census, was 174,051; total number of acres of farm lands, 17,994,200; of which 11,515,965 were improved, 5,740,864 under timber, and 737,371 of unimproved quality; cash value of farms under cultivation, $1,043,481,582, exclusive of $35,658,196 value of implements and machinery; amount of wages paid for husbandry during the year, $23,181,944; total value of farm products, $183,946,027; of orchard stuffs, $4,208,094; of market-gardens, $1,810,016; of lumber, $2,670,370; of live-stock on farms, $115,647,076; of home manuf., $1,503,754. The relative value of agricultural products, and the number and value of farm-animals, are given in this work under the names of each of the principal crops and animals. — The manufacturing interests of the State are both various and extensive, being celebrated not only for the working of iron and the manufacture of steel and glass, but also for her textile fabrics. Cotton-stuffs and yarn are extensively produced, bringing *P.* next in rank to Massachusetts in the manufacture of these fabrics. Steam-engines, machinery, cutlery, nails, stoves, leather, boots and shoes, chemicals, etc., are the other leading industries of the State. The amount of capital invested in manufactures and the number of manufacturing establishments in *P.*, as reported in the last census, were larger than in any other State, while the value of products was greater than in any other except New York. *P.* has two ports of entry, Philadelphia and Erie, and one port of delivery, Pittsburgh. The extent of commerce at these ports is exhibited in the articles on these three cities. — The Commonwealth has a very extensive system of internal communication by roads, railroads, and canals. In 1880 there were 151 trunk and branch lines of railroad in operation, in all 6,010 m. in extent, as shown in the following table, from which, however, have been excluded, for sake of brevity, the lines under 5 m. in extent: —

Fig. 392. — SEAL OF PENNSYLVANIA.

Companies.	Total length of line.	Total length of line in *P.*
	Miles.	Miles.
Alleghany Valley	259.50	259.50
Atlantic and Great Western	422.83	126.04
Bachman Valley	13.00	9.00
Bald Eagle Valley	53.69	53.69
Barclay	16.33	16.33
Bedford and Bridgport	49.20	49.20
Bellefonte and Snow Shoe	21.20	21.20
Bell's Gap	8.30	8.30
Berlin Branch	7.00	7.00
Buffalo, Bradford, and Pittsburgh	25.97	18.17
Buffalo, Chatauqua Lake, and Pittsburgh	44.00	6.20
Buffalo, New York, and Philadelphia	120.55	41.90
Buffalo Valley	8.12	8.12
Catasauqua and Fogelsville	25.50	25.50
Catawissa	97.10	97.10
Chartiers	22.80	22.80
Chester Creek	7.25	7.25
Chester Valley	21.50	21.50
Cleveland and Pittsburgh	199 77	15.00
Colebrookdale	12.80	12.80
Columbia and Port Deposit	39.40	26.60
Connecting	6 74	6.74
Corning, Cowanesque, and Antrim	64 00	48.36
Cornwall	9.23	9.23
Cumberland Valley	82 20	68.30
Delaware Western	19.92	2.39
Delaware, and Hudson Canal Co.'s R.R.	155.53	154.30
Delaware, Lackawanna, and Western	207 50	207.50
Dillsburg and Mechanicsburg	7.70	7.70
Dunkirk, Alleghany Valley, and Pittsburgh	90.60	48.30
East Brandywine and Waynesburg	28.11	28.11
East Broad Top	30.00	30.00
East Mahanoy	10.70	10.70
East Pennsylvania	36.00	36.00
Ebensburg and Cresson	11.00	11.00
Elmira and Williamsport	76.70	69.90
Emlenton, Shippenville, and Clarion	29.70	29.70
Erie and Pittsburgh	84.47	84.47
Fayette County	12.67	12.67
Foxburg, St. Petersburg, and Clarion	13.20	13.20
Hanover Junction, Hanover and Gettysburg	30.00	30.00
Hanover and York	18.60	18.60
Harrisburg and Lancaster	53 67	53 67
Harrisburg and Potomac	27.13	27.13
Huntingdon and Broad Top Mountain	61.30	61 30
Ironton	10.00	10 00
Jamestown and Franklin	51.10	51.10
Jefferson	45.50	45.50
Karns City and Butler	17.00	17.00
Kendall and Eldred	15 00	15 00
Keystone Coal	5.50	5.50
Lake Shore and Michigan Southern	864 60	49.35
Lancaster and Reading Narrow Gauge	15 30	15.30
Lawrence	22.04	9 36
Lehigh and Lackawanna	25.00	25.00
Lehigh and Susquehanna	154.75	154.75
Lehigh Valley	233.25	233.25
Lewisburg, Centre, and Spruce Creek	43.42	43.42
Ligonier Valley	10.50	10.50
Little Schuylkill	31 20	31.20
Littlestown	9.40	9.40
Lykens Valley	20.00	20.00
McKean and Buffalo	22.15	22.15
Mifflin and Centre County	12.31	12.31
Mill Creek and Mine Hill	6.77	6.77
Mine Hill and Schuylkill Haven	66.50	66.50
Mont Alto	18.13	18.13
Montrose	28.00	28 00
Mount Pleasant and Broad Ford	9.60	9.60
Muncy Creek	7.50	7.50
Nesquehoning Valley	17.62	17.62
New Castle and Beaver Valley	14.95	14.95
New Castle and Franklin	38.00	38.00
New York, Lake Erie, and Western	525.69	41.48
North-East Pennsylvania	9.80	9.80
Northern Central	150.71	102.15
North Pennsylvania	88.20	88.20
Oil City and Ridgeway	6.00	6.00
Olean, Bradford, and Warren	23.00	10.47
Parker and Karns City	10.50	10.50
Peach Bottom	55.00	55.00
Pennsylvania	429.09	429.09
Pennsylvania Coal	47.09	47.09
Pennsylvania Lackawaxen Branch	15.87	15.87
Pennsylvania and Delaware	38 62	20 52
Pennsylvania and N. Y. Canal	118.22	118.22
Peoples'	6.06	6 06
Perkiomen	38.60	38 60
Philadelphia and Baltimore Central	46.00	44.00
Philadelphia and Erie	287.49	287.49
Philadelphia, Germ., and Norristown	29.25	29 25
Philadelphia, Newtown, and New York	22.00	22.00
Philadelphia and Reading	327.00	327.00
Philadelphia and Trenton	26.60	26.60
Philadelphia, Wilmington, and Baltimore	112.18	19.09
Pickering Valley	11.30	11.30
Pittsburgh and Castle Shannon	9.12	9.12
Pittsburgh, Cincinnati, and St. Louis	200.90	35.10
Pittsburgh and Connellsville	151.50	145.70
Pittsburgh, Fort Wayne, and Chicago	468.39	48.78

Companies.	Total length of line.	Total length of line in *P.*
	Miles.	Miles.
Pittsburgh and Lake Erie	70.50	60.50
Pittsburgh, New Castle, and Lake Erie	30.00	30.00
Pittsburgh Southern	36.00	36.00
Pittsburgh, Titusville, and Buffalo	120.00	120.00
Pittsburgh, Virginia, and Charleston	30.00	30.00
Reading and Columbia	41.27	41.27
Reading and Lehigh	41.20	41.20
Salisbury	8 67	8.67
Schuylkill Valley	21.20	21.20
Shamokin Valley and Pottsville	31.10	31.10
Sharon	13 00	13.00
Sharpsville	7.00	7.00
Shenango and Alleghany	46.00	46.00
Somerset and Cambria	9.10	9.10
South Mountain Railway and Mining	17 78	17.78
Southern Pennsylvania	23.30	23.30
South-West Pennsylvania	41.90	41.90
Springbrook	8.50	8.50
State Line and Sullivan	24.00	24.00
Stony Creek	10.30	10.30
Sunbury, Hazleton, and Wilkesbarre	43.44	43.44
Sunbury and Lewistown	43.33	43.33
Tioga	48.00	48.00
Tresckow	6.50	6.50
Tyrone and Clearfield	60.89	60.89
Waynesburg and Washington	27.80	27.80
West Chester	9.00	9.00
West Chester and Philadelphia	26.30	26.30
Western Maryland	90.00	.50
Western Pennsylvania	84.55	84.55
Wheeling, Pittsburgh, and Baltimore	32.00	18 00
Wilmington and Northern	72.00	60.40

P. has also numerous canals, in part constructed by private companies, and in part by the State government (see CANAL). The number of national banks in operation in 1879 was 235, having a paid-in capital of $55,909,840, and an outstanding circulation of $42,247,305. There were besides 313 State and saving-banks and private bankers, whose aggregate capital was $10,807,358; deposits, $29,979,915. The debt of the State, at beginning of 1879, was $21,875,620, consisting of the following obligations:

Over-due loans, upon which interest has been stopped and not presented for payment	$43,843
Redeemable loans of 5 and 6 per cent, upon which interest has been stopped and not presented for payment	131,750
Six per cent payable in 1879	400,000
Five per cent payable in 1882	395,000
Four and a half per cent payable in 1882	87,000
Six per cent redeemable in 1877, and payable in 1882	2,118,000
Five per cent redeemable in 1877, and payable in 1882	90,400
Six per cent redeemable in 1882, and payable in 1892	9,271,850
Five per cent redeemable in 1882, and payable in 1892	723,950
Five per cent redeemable in 1892, and payable in 1902	8,000,000
Six per cent agricultural, payable in 1922	500,000
Relief notes in circulation, etc	113,827
Total debt	$21,875,620

Pennsylvania R.R. This Co., chartered in 1846, connects Philadelphia with Pittsburgh, and thence with its numerous ramifications West, is perhaps the largest railroad corporation in the world, representing a total cash capital of about $175,000,000. The length of lines owned by the Co. is 429.91 m.; lines leased, 1,285.51 m.; total length of lines operated, 1,715.22 m. "In addition to the above lines the Co. lease and operate the Delaware and Raritan Canal in the State of New Jersey, 66 m., and the Columbia and Port Deposit R.R. in Pennsylvania, 39.26 m., and the Columbus, Kinkora, and Springfield R.R., in New Jersey, 14.37 m. long. The Co. also lease, control, and operate, through the Pennsylvania Co., an extensive system of railroads, west from Pittsburgh, in aggregate length 3,588.00 m. The Co. has also a large interest in, and control over, several Southern railroads and steamship lines. Prominent among these is the line via Baltimore, Washington, Fredericksburg, Richmond, Danville, and Southwest. They have also control over the Northern Central, the Cumberland Valley, Alleghany Valley, etc., railroads. The Co. have recently established a steamship line to Europe. Their stock interest in the American Steamship Co. amounts to $900,000. They are also largely interested in coal mining and transportation. Their coal lands are extensive, including joint partnership in the Mineral R.R. and Mining Co., the Susquehanna Coal Co., the Summit Branch Co., and other mining corporations. The Huntington and Broad Top R.R. also brings to its tracks a large coal traffic. At Altoona the Co. have mechanical shops unequalled in the country for capacity. Their equipment of every kind is manufactured at this establishment. The *P. R.-R.*, as at present operated, is made up by the consolidation of the lines of several companies between Philadelphia and Pittsburgh." *Poor's Manual*, 1879.—The general balance of accounts of the Co., Jan. 1, 1879, was as follows:

Liabilities.

Capital stock (1,377,404 shares at $50 per share)	$68,870,200.00
First mortgage bonds, due 1880	4,970,000.00
General mortgage bonds, due 1910	19,999,760.00
Consolidated mortgage bonds, due 1905	29,145,000.00
Navy yard mortgage registered bonds, due 1881	1,000,000.00
State lien on public works, bearing 5% interest, and payable in annual instalments of $460,000, applicable first to interest, and the remainder to principal. Original amount, $7,500,000	4,337,823.38
Mortgages and ground rents payable	1,294,279.91
Accounts payable	5,778,844.93
Appraised value of securities, and equipment of road and canal, owned by United N. Jer. R.R. and Canal Companies, and transferred with the lease	7,685,339.13
Balance to credit of profit and loss	4,057,815.14
Total liabilities of the company	$147,139,062 49

Property and Assets.

Railroad and branches between Harrisburg and Pittsburgh, 340.73 m., and cost of stations, warehouses, and shops on the whole road	$24,563,690.98
Philadelphia and Columbia R.R., 80.39 m.	5,375,733.43
Equipment, including shop machinery, and also including equipment of canal, consisting of schooners, barges, and tugs	17,513,296.99
Real estate and telegraph line	9,264,866.66
Extension R.R. to Delaware River, 8.80 m., including wharves and elevator	2,070,098 15
Bonds of railroad corporations	30,467,892.07
Capital stocks of railroad corporations	27,098,889.92
Bonds and stocks of municipal corporations, coal, canal, and bridge companies, etc.	9,103,728.74
Mortgages and ground rents receivable, etc.	243,905.00
Anthracite coal lands at Hazleton, Hamilton, Eastwick, etc.	792,096.86
Appraised value of equipment and securities owned by united companies	7,685,339.13
Fuel and materials on hand	1,690,033.02
Bills and accounts receivable and advances to railroad corporations	7,258,996.91
Cash balance (in Joint Stock Bank, London, and other parties)	1,186,955.94
Cash balance in hands of agents and treasurer	2 823,538.63
Total property and assets of the company	$147,139,062.49

Pennsylvania Co. was chartered in 1870 for the purpose of managing, in the interest of the Pennsylvania R.R Co., the railroad leased and controlled by this Co. W. of Pittsburgh.

The aggregate length of lines managed by this Co. in 1879 was 3,535 m. Cap. stock, $11,000,000 (common, $3,000,000; preferred, $8,000,000); judgment 6% bonds $7,000,000; registered 6% bonds, $3,200,000

Pennsylvania and Delaware R.R. runs from Pomeroy, Pa., to Delaware City, 38.62 m. This Co., located in Philadelphia, is the consolidation in 1870 of the Pennsylvania and Delaware, and the Delaware and Pennsylvania R.R. Cos. It is rented to the Pennsylvania R.R. Co., the lessees paying the net earnings after interest on equipment and cost of operation. Cap. stock, $900,000; funded debt, $1,602,000.

Pennsylvania and New York Canal and R.R. runs from Wilkesbarre, Pa., to Waverley, N. Y., 105.05 m.; short branches to mines 22.77 m. This Co., whose principal office is in Philadelphia, was chartered in 1867. The section between Wilkesbarre and Lackawanna Junction (9.6 m.) is rented to the Lehigh Valley R.R. Co. Cap. stock, $5,061,700 (common, $50 shares, $1,061,700; preferred, $100 shares, $4,000,000); funded debt, 1st mortgage, 7%, $3,000,000. Cost of road and equipment, $5,841,660.

Pennsylvania Coal Company's R.R. runs from Hawley to Port Griffith, Pa., 47.09 m.; Lackawaxen branch, 15.87 m. This Co., chartered in 1838, has its general offices in New York City. The line consists of a gravity road worked by stationary engines. The Lackawaxen branch is rented to the New York, Lake Erie, and Western R.R. Co. for $35,000 a year. Cap. stock, $5,000,000; funded debt, 1st mortgage, 7%, $472,500. Estimated cost of road, $2,000,000; real estate, $1,600,000.

Pennsylvania Fire-Insurance Co., located in Philadelphia, organized in 1825. *Statement*, Jan. 1, 1880: Cap. stock paid up, $400,000; net surplus, $807,073. Risks in force, $53,177,560; premiums, $632,884. Premiums received since the organization of the Co., $7,879,040; losses paid, $5,522,695; cash dividends paid to stockholders, $1,979,000.

Penny, the largest and most ancient British copper coin, weighing one ounce. Its value is about 2 cents.

Penny-Royal, an aromatic plant, the *Mentha pulegium*, common in the S. of Europe. The distilled water is much used as a vehicle for medicines for children, and in flatulent colics. This name is applied in America to a plant of a different genus, *Hedeoma pulegiolides*, which has the aroma of the *P.* of Europe, and is used for similar purposes.

Pennyweight, a weight equal to 24 grains, or the 20th part of an ounce troy. It is so called, because such was the weight of a silver penny in the reign of Edward I., when the *P.* was first adopted; abbreviated thus, dwt.

Pen-Rack, a piece of desk-furniture, to support an idle pen.

Pensacola. See FLORIDA.

Pension, a salary or allowance accorded to ex-public functionaries, and retired soldiers and sailors, for past services. — A French boarding-house, or school.

Pensioner, a soldier receiving a pension, but who has to make his appearance at certain times, and do certain duties.

Pen-Slides, an instrument for writing used by surveyors and map-drawers.

Penstock, PENTROUGH, the floodgate of a mill-pond. — An instrument to supply water to a water-wheel.

Pentagraph, PANTOGRAPH, an instrument for enlarging or reducing plans.

Pen-Tray, a small wooden tray for holding pens.

Pen-Wiper, a fancy ornament of patch-work, cloth, etc., for cleaning pens of the ink.

People's Fire Insurance Co., located in New York, and organized in 1851. *Statement*, Jan. 1, 1880: Cap. stock paid up, $150,000; net surplus, $103,739. Risks in force, $8,857,310; premiums, $51,832. Premiums received since the organization of the Co., $1,727,586; losses paid, $851,613; cash dividends paid to stockholders, $399,613.

People's Fire Insurance Co., located in Trenton, N. J., organized in 1861. *Statement*, Jan. 1, 1880: Cap. stock paid in, $300,000; net surplus, $181,360. Risks in force, $16,897,544; premiums, $201,089. Premiums received since the organization of the Co., $1,393,989; losses paid, $629,313; cash dividends paid to stockholders, $152.000.

People's Insurance Co., a fire-insurance Co., located in Newark, N. J., and organized in 1866. *Statement*, Jan. 1, 1880: Cap. stock paid up, $300,000; net surplus, $55,326. Risks in force, $19,710,324; premiums, $222,380. Premiums received since the organization of the Co., $2,359,372; losses paid, $1,121,263; cash dividends paid to stockholders, $212,220.

Peoria, Pekin, and Jacksonville R.R. runs from Peoria to Jacksonville, 83 m. This road was sold under foreclosure, and bought for the present Co. in 1864 for $400,000. Cap. stock, $1,239,700 (common, $1,000,000; preferred, $239,700); funded debt, 1st mortgage, 7%, $1,000,000; 2d mortgage, 7%, $1,000,000. Address of the Co., Peoria, Ill.

Pepinieriste [Fr.], a nurseryman.

Pepitas, the Spanish term for small rough masses of gold, as discovered in the mines, and which are called by our miners nuggets. (See NUGGET.)

Pepper, a name given to several aromatic berries or fruits extensively used as condiments. Four different kinds are distinguished in commerce: black *P.*, long *P.*, Cayenne *P.*, and Guinea *P.*

Black P. [Dutch *peper;* Fr. *poivre;* Ger. *Schwartze pfeffer;* It. *pepe nero;* Port. *pimenta;* Sp. *pimienta*], the most important of all spices, is the product of a slender climbing-plant or vine (*Piper nigrum*), extensively cultivated in Malabar, in India, Sumatra, particularly the W. coast, and other islands in the Indian Archipelago, Siam, and Malacca. The best is that of Malabar. The plants begin to bear in their fourth year, are prime in their seventh, and gradually decline about their tenth year. Generally, the culture is not difficult, and two crops are yielded annually; but the produce is subject to great fluctuations. The berries are produced in clusters, and are gathered before ripening. They are at first of a bright red color, but by drying in the sun become black and corrugated on the surface; taste, hot and fiery; odor, slightly aromatic. The largest, heaviest, and least shrivelled are the best. *P.* sold ground is sometimes adulterated with the powder of the husks of mustard-seeds, or burnt crusts; and Dr. Paris states that there are artificial berries, which may be detected by their crumbling when immersed in water. — *White P.*, the fruit of the same plant, gathered after it is fully ripe, and freed of its dark coat by maceration in water, is smooth on the surface, and milder than black *P.* It is little used.

Long P. [Fr. *poivre long;* Ger. *Lange pfeffer;* It. *pepe lungo*], is also the product of a climbing-plant (*P. longum*), abundant in the E. Indies. The berries are small, and disposed in short, dense, terminal spikes. They are gathered unripe and dried, when they become of a dark-gray color. Their odor is faintly aromatic, but in taste they are exceedingly hot.

Cayenne P. See CAPSICUM.

Guinea P. consists of the aromatic seeds of two species of amomum (*A. grana paradisi* and *A. grandiflorum*), found on the W. coast of Africa, and imported into Britain from Sierra Leone and other places. They are powerfully stimulant and cordial, and are used for the same purposes as cardamoms.

Imp. duty: *P.* of all kinds, ground, 10 cts. per lb.; unground, 5 cts. per lb ; dust, 5 cts. per lb.

Pepper-Box, a cruet for holding ground pepper for table use.

Pepper-Dredge, a kitchen pepper-box.

Pepper-Mill, a hand-mill for grinding pepper.

Peppermint, a species of mint, *Mentha piperita*, differing from spearmint (see MINT) by having a more pungent and camphorous taste. It is extensively cultivated in several parts of the U. States for the production of the essential oil of *P.* The oil made in Wayne County, New York, is particularly noted for its excellence; it is largely exported to Europe, in tin cans holding 20 lbs. *P.* oil is of a greenish color; it is chiefly used for flavoring confectionery, and in the preparation of essences and cordials. A solution of the oil in alcohol gives the *essence of P.*, a very popular carminative. *P. cordial* or *P. water* is an aromatic drink, flavored with *P.* oil.

Perambulator. See PEDOMETER.

Perbends, a building term for stones carried through the whole thickness of a wall.

Percaline [Fr.], fine cotton print.

Percentage, PER CENT, a rate or commission per hundred. It is usually thus expressed, %.

Perch, a linear measure of 5½ yards; a square perch is equivalent to the 160th of an acre, or the 40th of a rood. — Also the name of a fish, one species, the Sander (*Perca lucio-perca*), is very common in the rivers which empty themselves into the Black Sea. It is cured like cod, and might readily supply the place of it. The roe is much in request in the Levant; the oil is also more in esteem than that of other fish, and might very well be used for burning, for purposes of tanning, for the manufacture of soap, for the preparation of common colors, etc.

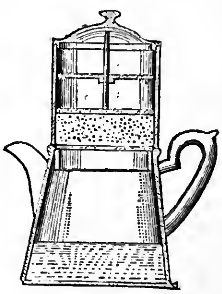

Fig. 393. — PERCOLATOR.

Percolator, a filter coffee-pot.

As originally invented by Count Rumford (Fig. 393), it consists of an upper cylindrical vessel with a perforated bottom, in which the ground coffee is placed and covered with a perforated disk having a stem, by which it may be pressed down so as to compact the coffee and allow boiling water poured thereon to percolate the mass and pass into the coffee-pot below.

Percussion-Caps, small detonating copper caps for exploding the charge of a gun or pistol. They are made in a wonderfully quick manner out of sheet-copper by the aid of stamping-machines. The inside of the cap is touched with adhesive varnish by a pencil; and the chemical powder is sprinkled on the varnish, to which it adheres. This powder is usually fulminating mercury and chlorate of potash; but for cannon, the former is replaced by sulphuret of antimony and pounded glass. The cap is placed on a nipple over the touchhole, and a blow with the lock-hammer explodes it. It seems strange that, notwithstanding the extent of our home manufacture, we still imported *P.-C.* from England, in 1879, to the value of $66,965. — *Imp.* duty, 40 per cent.

Percussion-Powder, a fulminating substance ignited by percussion.

Percussion-Stop, a pianoforte stop to the harmonium, which renders the touch precisely like the pianoforte.

Perelle, a name for the crab's eye lichen, the *Lecanora parella*, found on rocks in mountainous countries, which yields a purple dye equal to that of archil.

Perfect, to render complete, as finishing the printing of both sides of a sheet. — Making the sheets of a quire or ream of paper correct. — To elaborate, to finish off.

Perfecting-Press, a printing-press for making perfect copies; that is to say, printing paper on both sides during one passage through the press. (See PRINTING-PRESS.)

Perforate, to make full of holes; to bore or pierce through.

Perforated Plates, brass stencil plates for making letters or figures on paper; or for marking linen.

Perfume, an essential essence; an agreeable scent. A good perfume should leave no residue on evaporation, and the ingredients should be combined so harmoniously that no particular one should be perceptible. Hence well-prepared eau-de-Cologne may be considered the perfection of perfumery. Some of the most exquisite of perfumes are obtained from the most offensive substances. In olden times the most delicate perfumes were distilled from flowers, whose names they bore; but chemistry has shown how to obtain them from other sources. To give one example, a peculiarly fetid oil, called fusel-oil, is formed during the making of brandy and whiskey. Now this loathsome oil, by a particular mode of treatment, is made to yield the fragrant *oil of pears;* by another process, *oil of apples;* and by others, *oil of grapes* and *oil of cognac.* The *oil of pine-apples* is produced from sugar and putrid cheese. The *oil of bitter almonds* is a resultant from aquafortis and the offensive oils from gas tar. The dainty *eau de mille fleurs* is made from the drainage of cow-houses. And in all these cases, there is not the same kind of fraud which is practised in ordinary adulterations; for though the perfumes are not actually, in the present state of things, produced from the flowers and fruits which give them their names, yet they are really identical, or nearly so, in chemical composition with the original perfumes; nature mixes the ingredients in one case, man in the other, but the ingredients are the same. It is, however, on the vegetable kingdom that the perfumer mostly depends for the delicate materials of his art. Flowers, leaves, stalks, shoots, husks, tendrils, seeds, bark, roots, pith, wood, sap — all are acceptable to him, if he can obtain fragrant extracts out of them. Numerous processes — steeping, boiling, fermenting, distilling, etc. — are employed in making the perfumes; and numerous names are given to them when made. See BALSAM, DECOCTION, DENTIFRICE, ESSENCE, EXTRACT, GUM, INCENSE, INFUSION, LOTION, OIL, OINTMENT, PASTE, PASTIL, POMADE, POWDER, RESIN, SALT, SPIRIT, SIRUP, etc.

Perfumer, one who makes or sells essences and perfumes.

Perfumery, perfumes in general. — The art of preparing essences and perfumes.

Periodical, a publication that appears at stated intervals; a weekly, monthly, quarterly, or serial.

Periwig, a peruke; a wig to cover a bald head.

Periwinkle, a species of mollusc, the *Litorina litorea*, largely used as food in England.

Permanent-Way, the finished ballasted road of a railroad.

Permit, a written license or permission from an officer of the customs to transport goods from one place to another, showing the duty on them to have been paid.

Permanent White. See BARYTES.

Permutation-Lock, a lock whose moving parts can be transposed, so that, after having been arranged in a certain way, it becomes necessary, before shooting the bolt, to arrange the tumblers.

Pernambuco. See BRAZIL.

Pernambuco Wood. See BRAZIL WOOD.

Perpiguan Wood. See NETTLE-TREE.

Perquisite, a privileged grant; an extra allowance or fee beyond a salary.

Perrières. See BURGUNDY WINES.

Perrotine Printing. See CALICO PRINTING.

Perry, a fermented liquor made from pears, in the same manner as cider from apples. The pears best suited for producing this liquor are exceedingly harsh and tart; but it is itself pleasant and wholesome. See CIDER.

Perse [Fr.], chintz.

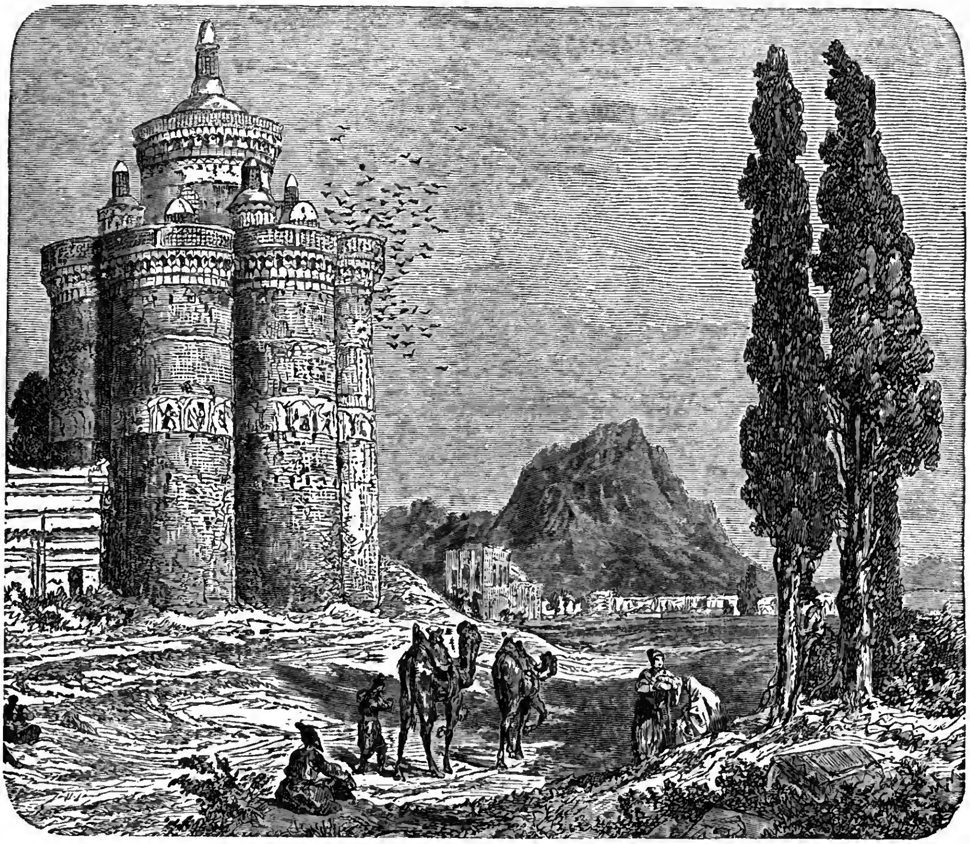

Fig. 394. — PERSIAN PIGEON-TOWER.

Persia, a kingdom in Asia, extending from lat. 26° to 39° N., and from lon. 44° to 62° E. lon. and bounded N. by the Russian Empire, Caspian Sea, and Tartary; E. by Afghanistan and Beloochistan; S. by the Persian Gulf; and W. by the Turkish Empire. Area, 450,000 sq. m. A vast portion of this area is, however, an absolute desert, and the population is everywhere so scanty as to not exceed, on the average, 7 inhabitants to the sq. m. According to a carefully made estimate, furnished by the British Secretary of Legation, in May, 1868, the pop. of *P.* at that period numbered:

Inhabitants of cities	1,000,000
Pop. belonging to wandering tribes	1,700,000
Inhabitants of villages and country districts	1,700,000
Total population	4,400,000

The largest cities of *P.* are Tauris, or Tabreez, with 120,000; Teheran, or Tehran, the capital, with 85,000; Meshed, with 70,000; Ispahan, with 60,000; and Yezd, with 40,000 inhabitants. The one million of inhabitants of towns constitute the pure Persian race, and more than half of the remaining population belongs to the Turkish, Lek, Koordish, and Arab tribes, which are spread over the whole territory. The government is a military despotism, vested in a sovereign under the title of Shah.

The country exhibits great diversities of surface, climate, and productions. Its most remarkable features are its chains of rocky mountains, — its long, arid, riverless valleys, — and still more extensive salt or sandy deserts. In the N. and E. parts it is cold, mountainous, and barren; in the middle parts, sandy and desert; in the W. and S. it is warm and fertile; and "dreariness, solitude, and heat" are, according to Morier, the chief characteristics of the shores of the Persian Gulf. The greater portion is devoted to pasturage, on which are reared horses, sheep, and goats. The horses, stronger and more serviceable than the Arabian, are highly esteemed. The sheep are of the long-tailed species, producing, however, very fine wool; while that of the goats of Kerman possesses many of the qualities so much esteemed in the Cashmere variety. The fruits are of peculiar excellence; and the wine of Shiraz is celebrated throughout the East. The mulberry also grows in such abundance, especially in the north, as to render silk the great staple of the kingdom. The grains cultivated are chiefly those of Europe. The other vegetable productions are cotton, tobacco, sugar, drugs, and dye-stuffs. The chief mineral products are copper, iron, salt, bitumen, and naphtha. Fig 394 represents one of the pigeon towers with which some of the large cities are enclosed as by a *cordon* of forts, and which are perhaps, the most curious structures to be found in *P.* These towers, interiorly divided into thousands of little triangular niches, in which the pigeons make their nests and rear

their young, are intended for the collection of guano as a fertilizer for the melon gardens, so numerous throughout *P.* — In former times *P.* was distinguished for the manufacture of all the fabrics suited to the ostentatious taste of oriental countries; and these manufactures are, though to a limited extent, still in existence. The other articles made consist chiefly of arms, earthenware, leather, paper, and jewelry.

The commerce of *P.* has at no time been considerable. Besides insecurity of property, it has to contend with various natural obstacles, — roads have scarcely ever existed, navigable rivers are unknown, and the seaports are few and unimportant. The only means of transport is on the backs of camels, mules, or small horses; hence the price of all commodities becomes greatly enhanced by the expense of carriage. The principal raw exports are silk, cotton, tobacco, rice and grain, dried fruits, sulphur, horses, wax, and gall-nuts; and the amount of the three first might be greatly extended. Of manufactured goods *P* sends out only a few, — almost entirely to Russia, — consisting of a considerable quantity of silk and cotton stuffs, with some gold and silver brocade. Besides Russia, the principal intercourse is with Turkey, Bagdad, Arabia, the Usbecks and Turkomans on their N. frontier, and India. In dealing with all these countries except the last, the balance of trade is in favor of *P.*, and the excess of her exports is returned in bullion (composed of ducats, dollars, German crowns, and silver rubles), which is chiefly transported to India in return for the large surplus produce brought thence annually, either by way of Bushire or of Cabul to Herat and Yezd. — The whole external trade of *P* may be roughly valued at $20,000,000 annually, of which $12,500,000 may be taken as the value of the imports, and $7,500,000 as that of the exports. The greater part of the commerce of *P.* centres at Tabreez, which is the chief emporium for the productions of N. India, Samarcand, Bokhara, Cabul, and Beloochistan. The principal articles of import into Tabreez consist of cotton goods of British manufacture, of the average value of $4,000,000; while the chief article of export is silk, shipped for France and Great Britain, of the average annual value of $550,000. All the European merchandise that reaches Tabreez passes by Constantinople to Trebizond, whence it is forwarded by caravans. There is no direct trade with the U. States, and only a very small one with Great Britain. The first regular postal service, established by Europeans, was opened in 1877. Under it, mails are conveyed from Julfa, on the Russian frontier, to Tabreez and Teheran, and from thence to the port of Resht, on the Caspian Sea.

Money, weights, and measures, and American equivalents:

MONEY.

The *Keran*	=	1,000 *Dinars*, or 20 *Shahis*	=	23 cts.
„ *Toman*	=	10 *Kerans*	=	$2.25.

The gold coins of *P.*, consisting of Tomans, five-Keran and two-Keran pieces, contain no alloy.

WEIGHTS AND MEASURES.

The *Batman*	=	40 *Sihrs* or 640 *Miscals*	=	13½ lbs. av.
„ *Collothun*	=	3½ *Cepichas*, or 6¼ *Chenicas*	=	1.809 gal.
„ *Artata*	=	8 *Collothun*	=	1.809 bush.
„ *Zer*	=	16 *Gerehs*	=	38 inches.
„ *Fersakh*, or *Parasang*			=	4½ miles.

Besides the weights and measures here enumerated there exist a great variety of local standards. In foreign commerce, Russian weights and measures are largely used.

Bushire, the only port of *P.* of some importance, on the Persian Gulf, in lat. 29° 0′ N., lon. 50° 52′ E.; pop. 15,000. It is a mean and dirty town, built on the northern extremity of a sandy peninsula. The anchorage consists of an outer and inner road; the former is not very safe, but the latter, distant about 2½ miles from the town, in 4½ fathoms mud, is free from danger. *B.* carries on a considerable trade, particularly with Calcutta, Bombay, and Java. Pop. 15,000.

Persian, a thin inferior silk chiefly used for lining garments.

Persian-Berries, the seeds of a Persian variety of *Rehamnus infectorius*, used as a dye in calico-printing, also called Arigum, or yellow berries. The plant is also now cultivated in France, and from that country the berries are chiefly imported.

Persian-Blinds, same as Venetian-blinds.

Persian Cement. See CEMENT (ARMENIAN).

Persian-Tobacco, the leaves of *Nicotiana Persica*, which are very fragrant and agreeable for smoking in pipes, but the tobacco is not suited to cigars from the difficulty in making it burn.

Persian Wheel, a revolving wheel with buckets for raising water in a river, or stream, for irrigating or other purposes.

Persicot, a kind of liquor.

Persis, same as cudbear.

Personal-Property, money and movable goods — not landed property or houses.

Perth Amboy. See NEW JERSEY.

Peru, a republic of South America, between lat. 3° 25′ and 21° 48′ S., and lon. 68° and 81° 20′ W. Peru is bounded N. by Ecuador, E. by Brazil, S. E. and S. by Bolivia, and W. by the Pacific Ocean. Its coast reaches from the mouth of the Rio Tumbez to that of the Loa, 1240 m. *P.* is divided into 21 departments. Its area is about 503,000 sq. m., with a population, according to a census taken 1876, of 2,673,075. It is estimated that 57 per cent of that population are aborigines, or Indians, and that 23 per cent belong to mixed races, Cholos and Zambos. The remaining 20 per cent are divided among descendants of Spaniards, Negroes, Chinese, and Europeans, the latter forming barely 2 per cent of the total pop., comprising chiefly Italians and Germans. *Lima*, the capital of *P.*, is a fine city situated at 6 m. from its port, Callao, on the Pacific, with which it connects by railroad. Its climate is very agreeable, the range of the thermometer throughout the year being from 73° to 75° in winter, and 86° to 87° in summer. Lima has manufactories of gold lace and fringe, glass, cotton, paper, chocolate, etc.; but almost all the goods consumed there are foreign. Its pop., at the enumeration of 1876, was returned at 160,056. — The present constitution of the republic is modelled on that of the U. States. The public revenue is mainly derived from the sale of guano, and to a small extent from customs. Direct taxation does not exist. Of the actual revenue and expenditure of the government in recent years, there are no official returns, but it is known that there were large annual deficits, the profits from the sale of guano not proving sufficiently large to cover the cost of immense public works, including a railroad to the summit of the Andes, and the construction of an iron-clad fleet. Besides internal liabilities and a floating debt of an unknown amount, there was, in 1879, a considerable foreign debt of $245,050,000. *P.* has been since engaged in a long war against Chili, and it is impossible to foresee how the country will appear, politically and financially, at the end of this disastrous conflict.

The country is traversed throughout its length by the magnificent chain of the Andes, running parallel to and about 60 m. distant from the coast, the region between being sandy desert, except where watered by transverse mountain streams. The valleys among the mountains are very fertile; and the Cordilleras are rich in minerals, among which silver, quicksilver and copper are the most conspicuous, constituting the chief source of the wealth of *P.* It is intersected by numerous fine rivers, forming the head streams of the Amazon, by which it has complete communication with the Atlantic. Its medicinal productions are of great value, comprising cinchona, or Peruvian bark, sarsaparilla, copaiba, etc. The Huanillos, Guanape, Macabi Islands, Pabillon de Pica, and Lobos are famous as the sources whence Europe is being supplied with Peruvian guano. The principal imports are cotton manufactures, ironware and cutlery, woollen goods, and machinery. The chief exports are guano, nitrate of soda, and sheep, alpaca wool, sugar, silver, and cinchona. There are in *P.* over 15,000 mines, of which only about 600 were worked when the war broke out. From 1869 to 1878 $36,000,000 worth of silver passed through the Lima mint for coinage or assay. Gold and silver pay an export duty of 3 per cent. There is but a small production of gold, but silver is largely produced and exported either as metal or ores. Coinage is free and unlimited, the mint receiving bullion and returning its value in coin. Silver is found in all the western range of the Andes, from lat. 3° to 22° S. The district of Cerro de Pasco produced, from 1630 to 1849, $475,000,000. A tunnel, on the plan of the Sutro Tunnel in Nevada, was projected at Cerro de Pasco, and was calculated to open 100,000 square yards of surface and $500,000,000 worth of ore. Other mines of equal value might be opened when better railroad facilities exist in the province of Puno. Before the introduction of the modern system of railways, the difficulties encountered in smelting silver were incredible, the ores being transported on mules' backs over rugged mountain paths. The

average exportation of guano from 1869 to 1878 is estimated at 400,000 tons per year, valued at $23,000,000.—The foreign commerce of *P.* is chiefly with Great Britain and the U. States. The exports to Great Britain for the year 1878 amounted to about $23,000,000, and the imports from that country (chiefly cotton and woollen goods) to $8,000,000. The exports to the U. States for the same year amounted to $1,857,859, the bulk of which consisted of guano, $606,466, and nitrate of soda, $1,161,127; the value of imports from the U. States was $1,293,991, consisting chiefly of wheat ($186,214), cotton goods ($31,741), steam engines and machinery ($229,282), petroleum ($76,589), perfumery ($18,536), butter ($10,947), lard ($107,076), quicksilver ($18,975), sewing machines ($15,811), soap ($10,999), and lumber ($142,503). —The Peruvian merchant navy in 1879 consisted of 101 vessels, with a total of 9,792 tons, 12 of which were steamers, with an aggregate of 514 tons. A system of railroads, designed to develop the exploitation of the mineral wealth of the country, has been in course of construction since the year 1852, mainly at the expense of the State. In 1879 there were open to traffic, or in course of construction under the direction of the American contractor, H. Meiggs, 11 lines belonging to the State, 1,281 m. in total length, and costing 128,354,000 soles, or $128,354,000; 8 lines belonging to private persons, 496 m. in length, and costing 24,420,000 soles, or $24,420,000; and 2 lines belonging in part to the State and in part to individuals, 253 m., costing 27,200,000 soles, or $27,200,000, being a total of 22 lines, 2,030 m. in length, and representing a cost of 179,974,600 soles, or $179,974,600. The construction of the lines of railway belonging to the State was undertaken solely for purposes of public utility, remunerative results not being calculated upon in a country so sparsely populated as *P.* Referring to the longest of the State lines, from Arequipa to Puno, near the summit of the Andes, the British minister, in a report of the year 1878, says: —"232 m. of difficult railway have been made, at an expense of about $30,000,000, in order that three or four goods trains may run per week." Of the railroads belonging to private individuals, only the double line from Lima to Callao, 8 m., from Lima to Chorales, 9 m. in length, the property of an English Co., was reported to be a commercial success.

Money, weights, and measures, and their American equivalents:

MONEY.

The *Sole* or *dollar* = 100 *centesimos* = $0.935.

WEIGHTS AND MEASURES.

The *Ounce*	. . .	=	1·014 ounce avoirdupois.
" *Libra*	. . .	=	1·014 lb. "
" *Quintal*	. . .	=	101·44 " "
" *Arroba*	of 25 pounds	=	25·36 " "
	of wine or spirits	=	6·70 imperial gallons.
" *Gallon*	. . .	=	0·74 " "
" *Vara*	. . .	=	0·927 yard.
" *Square vara*	. .	=	0·859 square yard.

The French metric system of weights and measures was established by law in 1860, but has not yet come into general use.

The principal ports of *P.* are Paita, San Josē, Huanchuco, Callao (given below), Islay, Arica (given below), and Iquique. They are ports of entry for foreign commerce.

Arica, the principal southern seaport town in lat. 18° 28′ S., lon. 70° 10′ W. Its roadstead is much frequented. The foreign merchants reside chiefly at Tacna, 30 m. N. by rail. It is connected with Iquique by a submarine telegraphic cable. The district is subject to frequent shocks, and was devastated by the great earthquake of 1868. Chief exports are copper ore, wool, and silver, cinchona, and chinchilla skins. Value of goods exported in 1878, $2,476,811; of bullion, $4,072,782. Value of imports, $1,214,676. 38 sailing and 193 steam vessels entered the port in 1878. Pop. 7,000.

Callao, the chief Peruvian port for foreign commerce, in lat. 12° 6′ S., lon. 77° 14′ W., on the river Rimac, and 6 m. W of Lima, of which city it is the port. Its anchorage, partly sheltered by two islands, has been further improved by harbor walls, floating and wet-docks, and a good mole. The heat is here very oppressive, and natives and foreigners suffer from severe attacks of ague. Callao connects with Lima by railroad, and is almost the only port frequented by American vessels. In 1879, 18 American vessels of 17,717 tons entered and 18 vessels of 16,159 tons cleared, this port. In 1879 (before the opening of the war), the weekly and semi-weekly steamers of four lines, Chilian, English, French, and German, numbering 59, were engaged in the carrying service between Callao and Panama, Callao and the Chilian ports, and also the European ports *via* the Straits of Magellan. Pop. 30,000.

Peruvian Balsam, a fragrant oleo-resin, obtained from the *Myroxylum Peruiferum*.

Peruvian Bark. See CINCHONA.

Peseta, a Spanish silver coin, varying in value according to the purity and weight of the coinage; it may, however, be generally reckoned at about 20 cents.

Peso, a Spanish name for the dollar of exchange; a common name for the pound weight.

Peso-Duro, the hard dollar of Spain.

Peson [Fr.], a steelyard.

Pessary, a surgical instrument for supporting the vagina.

Pestle, a solid pounder for crushing things in a mortar.

Petard, an explosive for blowing up gates, etc.

Peter Cooper, a fire-insurance Co., located in New York city, and organized in 1853. Statement, Jan. 1, 1880: Cap. stock paid up, $150,000; net surplus, $190,043. Risks in force, $12,839,207; premiums, $28,311. Premiums received since the organization of the Co., $988,899; losses paid, $163,776; cash dividends paid to stockholders, $510-000.

Peter-Junk. See BARKERS.

Petersham, a rough woollen cloth made chiefly of mungo, used for great coats.

Petit-Grain, an essential oil obtained from the fruit and leaves of *Citrus bigaradio*.

Petit-Gris, the name for miniver fur in France.

Petroleum, MINERAL OIL, ROCK OIL, a liquid inflammable substance, of a dark color, exuding from the earth, and containing certain liquid and solid hydrocarbons, such as benzol, naphtha, eupion, paraffin, naphthalin, and asphaltum, mixed together in a state of solution in different proportions. It varies considerably in density and color, according to its composition; some qualities being dark and thick like treacle, while others are perfectly limpid and of a light-brown tint. *P.* was known to Herodotus as existing in Zante, and formed the source of the fire which the ancient Persians worshipped. Till lately, the best-known sources were the borders of the Caspian Sea, Amiano in Italy, Trinidad in the West Indies, and Rangoon in the East Indies, where vast quantities have been raised for many centuries, without apparent exhaustion. It is, however, its comparatively recently discovered and extremely copious springs and wells in Pennsylvania and Canada, which have given a vastly extended importance to the trade in mineral oil. *P.* is now used in enormous quantities as the cheapest illuminating oil, and that which furnishes the most intense light. Its consumption as a lubricating oil for machines has also been very large.

Mineral oil has always been occasionally found at various places in the U. States, and was sometimes used by the inhabitants of the locality before the recent discoveries; but it was not until August, 1859, that it was met with in large quantities. About this time a boring which was made at Oil Creek, Pennsylvania, reached an abundant source, for 1,000 gallons a day were drawn from it for many weeks. The news of the discovery of this copious oil-spring spread rapidly: thousands of persons flocked to the neighborhood in hopes of easily making a fortune by "striking oil." Before the end of 1860 more than a thousand wells had been bored, and some of these had yielded largely. The regions of the American Union in which *P.* has been found cover a large area in the States of Pennsylvania, New York, Ohio, Michigan, Kentucky, Tennessee, Kansas, Illinois, Texas, California, etc. In the vicinity of Oil Creek the bore-holes are usually about 3 or 4 in. in diameter, and are often 500 ft. deep, and even 800 ft. is not uncommon. To make a bore-hole 900 ft. deep, and procure all the requisites —steam engines, barrels, etc., for pumping the oil—costs about $5,000. In 1869 many of these wells still yielded regularly 300 barrels a day, but the supply has not continued with the same abundance. One of the luckiest wells flowed at its first opening at the rate of about 25,000 barrels a day. The apparatus used for working the oil-wells is very simple—a rude derrick, a small steam engine, a pump, and some barrels and tubs being all that is necessary. Fig. 395 will give the reader an idea of the scene presented by a cluster of oil-wells in the Oil-Creek region. Oil Creek received its name before the *P.* trade was established, from the oil found floating on the surface of the water. It is on the Alleghany River, about 150 m. above Pittsburgh, and here at its mouth is situated Oil City. The refining process consists in placing the crude oil into a large iron retort, connected with a condenser formed of a coil of iron pipes, surrounded by cold water. Heat is applied,

and the lighter hydro-carbons (*naphtha*) come over first. After the naphtha, the oils which are used for illuminating purposes, popularly grouped under the name of *kerosene*, distil off. A current of steam is then forced into the retort, and this brings over the heavy oils which are used for greasing machinery. A black tarry oil yet remains; and, finally, after the separation of this, a quantity of coke. The products are subjected to certain processes of purification, which need not here be described. The magnitude of our oil trade, as exhibited in the following statistical tables, can hardly be wondered at, considering the extremely low price at which this excellent illuminating and lubricating agent can be produced. — The production of *P.* in the oil-producing regions of West Pennsylvania for the 21 years from 1859 to 1879 was as follows: —

Year.	Barrels.	Year.	Barrels.
1859	82,000	1870.	5,673,195
1860.............	500,000	1871	5,715,900
1861	2,113,000	1872	6,531,675
1862	3,056,000	1873	7,878,629
1863	2,611,000	1874.............	10,950,730
1864	2,116,000	1875.............	8,787,506
1865.............	2,497,000	1876.	9,175,906
1866.............	3,597,000	1877.............	13,490,171
1867.............	3,347,000	1878.............	15,165,462
1868	3,583,176	1879.............	19,741,661
1869.............	4,210,720		

Grand total production of Pennsylvania, 130,823,731.

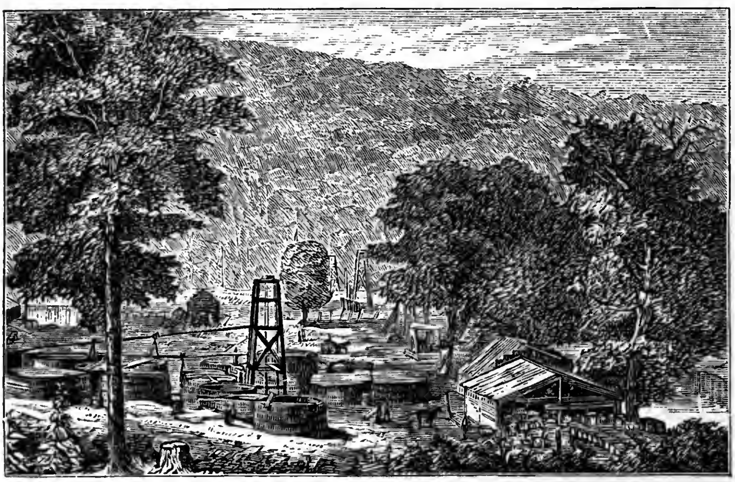

Fig. 395. — View on Hyde and Egbert's Farm, Oil Creek.

The following table exhibits the exports of *P.* from the U. States to all foreign countries for the 8 years from 1872 to Dec. 31, 1879. —

Year.	Crude.		Refined.	
	Gallons.	Dollars.	Gallons.	Dollars.
1872	16,355,081	2,761,096	118,871,007	29,626,360
1873	19,643,740	2.665,771	209,021,305	41,854,841
1874	14,430,851	1,428,494	208,635,382	30,497,191
1875	16,536,800	1,738,589	204,616,798	28,417,339
1876	25,343,271	3,343,763	221,900,446	44,448,361
1877	28,772,233	3.267,309	309,778,832	51,901,106
1878..........	23,883,508	2,150,390	308,896,307	39,094,451
1879..........	27,841,900	2,182,573	367,321,235	32,696,713
Total 8 years	172,807,384	19,538,385	1,949,041,312	298,536,362
Yearly average	21,600,923	2,442,298	243,630,164	37,317,045

Partly owing to the continued opening of new wells and the consequent increase in the production, also to the efforts made by several foreign nations to restrict by import duties the importation of refined *P.*, the market value of the oil has considerably diminished of late. The average prices of *P.* at New York, for the past 4 years, from 1876 to 1879, were as follows: —

Year.	Crude oil in bbls. per gallon.	Refined standard white oil, in bbls. per gallon
	Cents.	Cents.
1876....	10.50	19.12
1877.........................	9.12	15.92
1878.........................	6.37	10 78
1879.........................	7 10	8.08

Another evidence of over-production is seen in the steady increase of stocks in Europe and in the Pennsylvania oil regions, which, for 3,049,697 bbls. on Jan 1, 1877, increased to 4,147,000 bbls. in 1878, 5,705,611 bbls. in 1879, and 10,285,154 in 1880.

Russia is making efforts to compete with American *P.* in foreign markets, and owing to her tariff, reduced her importations at the Baltic and White Sea ports from 4,444,729 gallons in 1877 to 1,984,535 gallons in 1878. The *P.* oil-producing region of Russia extends along the Caucasus mountain range from the Caspian to the Black Sea, a distance of 1,500 m. There are only two districts in working operation, the most extensive of which is near the port of Baku on the Caspian Sea. This region was, in 1879, producing 28,000 bbls. of *P.* oil per day. A large amount of sand flows from the wells mingled with the oil. A French company had erected extensive refineries at Baku for refining the oil which in quality was said to be inferior to American oil. The extraction of mineral oil at Baku was from 1859 to 1872 only operated by a single company and the amount produced was but little increased From 1872 to 1877 the extraction was freed of monopoly, but the refined was subject to a duty of government tax. During this period the quantity produced was gradually but slowly increased. Since 1877 the manufacture of *P.* has been free from a tax on the native oil, while a duty of 7 cts. per gallon has been imposed on American P. Notwithstanding this discrimination, American *P.* in St. Petersburg, at $1.15 per poud of 36 lbs. was preferred to the home production at 90 cts. per pound. For illuminating purposes American oil is far superior to the Russian oil. The latter has a pungent odor, and smokes to such an extent as to make its use objectionable. It is, however, expected, from the geological formation, that deeper wells will give a better quality of oil. The oil produced at Baku is at the present time transported on floats from the Caspian Sea to Astrakhan at the mouth of the Volga, thence up the river Volga to Nijni Novgorod, thence by river and canals to St. Petersburg, a distance aggregating 2,250 m. The cost of transportation from Baku to the northern markets of the Russian Empire is greater than that for American *P.* to the same markets. — The recent discovery of *P.* oil in Germany has caused considerable excitement in Europe, but the extent of the territory and quality of the oil are as yet undetermined.

Imp. duty: crude *P.*, or rock oil, 20 cts. per gal.; refined, 40 cts. per gal.; residuum of *P.*, 20 cts. per gal.

Petticoat, a woman's loose lower garment, many kinds of which are kept ready-made in shops, as flannel, red, skeleton, stiff, and other petticoats.

Petty Cash-Book, a book for entering small receipts and payments.

Petty-Jury, a jury of twelve, summoned and empanelled to try offenders.

Petunse, Petunze, a felspathic rock containing an admixture of quartz, and used in China, when mixed with kaolin, for making porcelain.

Pewter, an alloyed metal, of which there are several kinds; the best consists of 100 parts of tin and 17 antimony. That used for plates and dishes is formed of 89 parts of tin, 7 of antimony, and 2 of copper; tin and zinc, and lead and tin

are sometimes used to make pewter. *Ley pewter*, chiefly used in England for large wine measures, is an alloy of 1 part of lead to 3 of tin.

Phaeton, a four-wheeled open carriage.

Pharmaceutist, PHARMACEUTICAL CHEMIST, an apothecary; one skilled in the choice, preparation, and mixture of drugs and medicines.

Pharmacopœia, a book or treatise describing the preparations of the several kinds of medicines, with their uses and manner of application.

Pheasant-Wood. See PARTRIDGE-WOOD.

Phenakistoscope, a philosophical toy, which illustrates the principle of impressions on the retina of the eye in a very ingenious manner.

Phenameine. See ANILINE (VIOLET).

Pfennig. See GERMANY (WEIGHTS AND MEASURES).

Phenic Acid, or Phenol. See CARBOLIC ACID.

Phial, a small bottle used for holding liquors and medicines.

Philadelphia, a large city and seaport of the U. States, and the metropolis of Pennsylvania, in lat. 39° 56′ 39″ N., lon. 75° 10′ 54″ W. It is situated on the W. bank of the Delaware, 136 m. N. E. of Washington, 87 m. S. W. of New York, and 96 m. from the open sea. It is traversed by the river Schuylkill, which divides the part known as West *P.* from the older portion of the town. Coextensive with the county of the same name, its area embraces 82,603 acres or 129 sq. m. The water-front on the Delaware measures 23 m. Second only to the city of New York in population, *P.* is second to none in the magnificence of its public and private buildings, and magnitude of its manufacturing and commercial interests. It is laid out with great regularity, and is particularly noted for the neat and cheerful appearance of its private residences. Tenement houses are here almost unknown; the average is about 6 persons to a dwelling, and even artisans have a private house for their family, a home outwardly cheerful to the sight, and inwardly provided with all modern improvements. The only drawback to the beauty and general comfort of *P.* is, owing to mismanagement of its municipal interests, the rude pavement and filthiness of many of its streets. The pop. of *P.* from 4,500 in 1700 rose to 70,287 in 1800, 188,797 in 1830, 258,037 in 1840, 408,762 in 1850, 565,529 in 1860, 674,022 in 1870, and 850,000 in 1880.

Harbor, Light-houses, Pilotage, etc. Vessels of the largest burden ascend the Delaware as far as Newcastle, and reach *P.* with the tide, the bar in the river below the city having 19 ft. at low and 25 feet at high water. The wharf front of the city is very deep, there being 57 feet at low water at the pier heads for half a mile, and not less than 25 feet for 3 m., of the river front. The entrance to the magnificent bay formed by the embouchure of the Delaware has Cape May on its N., and Cape Henlopen, on its S. side. The former, in lat. 38° 57′ N., lon. 75° 47′ 45″ W., is a sandy headland, rising about 12 ft. above the level of the sea. It is surmounted by a light-house 60 ft. in height. The light revolves once a minute; an eclipse of 50 seconds being succeeded by a brilliant flash of 10 seconds. It is seen in clear weather from 20 to 25 m. off. Cape Henlopen, marking the S. boundary of the bay, is in lat. 38° 47′ N., lon. 75° 4′ 45″ W. A little S. from it is a hill, elevated about 60 ft. above the level of the sea; and on it is erected a light-house 72 ft. in height, furnished with a powerful *fixed* light visible in clear weather ten leagues off. To the N. of this principal light, and close to the extremity of the Cape, a second light-house has been constructed, 36 ft. above the level of the sea, which is also furnished with a *fixed* light, which may be seen about six leagues off. The channel for large ships is between Cape Henlopen and the banks called the Overfalls. The navigation is, however, a little difficult, and it is compulsory on ships to take pilots. The latter frequently board them at sea; but, if not, as soon as a ship comes between the Capes, she must hoist the signal for a pilot, and heave to as soon as one offers to come on board. The distance in statute m. from *P.* to the Capes, by the usual steamboat channel, as laid down on the chart of the Delaware by the U. States Coast survey, is as follows: —

From Philadelphia (Market Street Wharf) to	Miles.
Fort Miffin landing (broad off in channel)	8 3-8
Chester landing, " "	16 5-8
Marcus Hook Landing, " "	20 1-4
Quarryville " " "	24 3-4
Dupont's " " "	26 3-8
Wilmington, by the Christiana, to bridge	31 3-4
New Castle, railroad wharf (broad off in channel)	34
Delaware City landing " "	39 5-8
Reedy Island " "	44 1 4
Port Penn landing	44 7-8
Liston's Tree (broad off in channel)	51 3-16
Liston's Point " "	51 5-8
Duck Creek Light (broad off in channel)	55 3-8
Bombay Hook Point " "	60 9-16
Buoy of the Middle	71 9-16
Ledge Light Boat	76 1-4
Buoy of the Lower (qr.)	83 5-8
Brandywine Light-house	89 9-16
Buoy of the Brown	93 1-16
Breakwater	102 3 8
Cape Henlopen	102 5-8
Cape May landing, by channel east of Pea Patch.	96

Commerce. The domestic and coastwise trade of *P.* is of great magnitude, and the extent and value of its foreign trade has of late advanced at a rate equalled by no other port in the Union. In the value of imports, *P.* stands fourth, being, in this respect, inferior only to New York, Boston, and San Francisco; as an exporting port it ranks fifth, coming after New York, New Orleans, Baltimore, and Boston. Its leading articles of export are anthracite and gas coals, iron, machinery, and other iron goods manuf. here, petroleum, raw cotton, and cotton goods, grain and provisions, live-stock, lumber, fertilizers, and tobacco. The value of exports and imports for the 20 years from 1860 to 1879 were as follows: —

Years.	Exports.	Imports.	Years.	Exports.	Imports.
	$	$		$	$
1860..	7,839,286	14,531,352	1870..	16,694,478	14,952,371
1861..	10 277,938	8,004,161	1871..	20,688,551	20,820,374
1862..	11,518,970	8,327,976	1872..	20,484,803	26,824,333
1863..	10,628,968	6.269,530	1873..	29,683,186	29,186,925
1864..	13,664,862	9,135,685	1874..	29,878,911	25,004,784
1865..	12,582,152	5,645,755	1875..	31,836,727	24,011,014
1866 .	17,867,716	7,331,261	1876..	50,539,450	21,000,000
1867..	14,442,398	14,071,765	1877..	37,823,356	20,126,032
1868..	15,706,445	14,218,368	1878..	48,362,116	21,048,197
1869..	15,872,249	16,414,535	1879..	50,685,838	27,224,549

The following statement shows the relative importance of principal articles exported to foreign countries during the year 1879: —

Articles.		Quantity.	Value.
Horned Cattle	No.	5,876	$471,270
Corn	bush.	14,000,698	6,615,558
Rye	"	509,393	439,854
Wheat	"	17,504,607	20,703,700
" Flour	bbls.	201,818	1,189,450
Mazina		....	205,174
Cars (railroad)	No.	620	228,521
Coal (bituminous and anthracite)	tons	52 635	164,258
Cotton (26,938 bales)	lbs.	12,923,279	1,404,139
" goods		....	102,432
Drugs and Chemicals		....	92,368
Furs and Fur Skins		....	164,155
Hops	lbs.	352,317	81,153
Iron and iron manufactures (all)		....	503,819
Leather (sole and upper)	lbs.	587,335	150,451
Oil-cake	lbs.	25,070,527	384,359
Oils, petroleum (crude)	galls.	3,241,503	218,184
" naphtha	"	2,750,027	181,263
" petroleum (refined)	"	82,370,211	6,930,040
" lard	"	268,479	115,108
Bacon and Hams	lbs.	80,686,178	4,238,758
Beef, fresh	"	11,133,861	989,678
" salt	"	5,322,057	267,486
Butter	"	605,529	96,557
Cheese	"	1,279,629	99,925
Lard	"	12,915,027	858,751
Molasses	galls.	2,368,773	319,323
Tallow	lbs.	9,201,599	628,616
Tobacco, leaf	"	9,564,171	650,945
" manuf.		....	182,494
Wood, boards	M.	5,107	86,617
" shooks		....	341,319
" hogsheads and barrels	No.	63,443	122,950
" hoops		....	244,282

The principal articles of direct import, for the year 1879, were as follows: —

Articles.		Quantity.	Value.
Barks (medicinal, etc.)	lbs.	391,283	$351,058
Chemicals		....	1,258,237
Coffee	lbs.	1,132,018	149,865
Dyewoods	cwt.	192,141	185,071
Hides, etc.		....	177,244
India-rubber (crude)	lbs.	2,435,710	1,310,934
Soda, nitrate of	"	5,597,711	116,601
Sulphur, etc. (crude)	tons	11,569	253,464
Buttons		....	116,944
Cotton, manuf. of		....	789,810
Hosiery, etc.		....	204,463
Earthenware, etc.		....	455,660
Fancy goods		....	205,660
Flax, manuf. of		....	958,155
Fruits		....	724,207
Furs, etc.		....	132,463
Iron, pig (58,227 tons)	lbs.	130,428,166	1,025,037
" in bars	"	6,418,208	113,786
" scrap	tons	56,689	1,021,649
" machinery		....	119,676
" other manuf. of		....	437,288
Leather		....	212,638
Opium	lbs.	148,676	495,564
Precious stones		....	216,778
Salt	lbs.	89,322,777	177,291
Silk, manuf. of		....	481,154
Soda, ash	lbs.	47,875,318	597,979
" caustic	"	4,641,126	113,553
Sugar, brown	"	145,418,622	5,296,108
" molasses	galls.	14,784,181	2,507,538
Tin plates	cwt	491,090	2,037,936
Wine, in casks	galls.	196,700	110,412
" in bottles	doz.	10,494	77,708
Wool, unmanufactured	lbs.	2,682,179	382,487
" dress goods	sq. yds.	2,963,652	736,257
" other manuf.		....	800,464

The following is a statement of the Live Stock received and sold at *P.* during the years 1850, 1860, and the ten consecutive years from 1870 to 1879: —

Years.	Beeves.	Cows.	Hogs.	Sheep.
1850	68,780	15,120	46,900	82,500
1860	90,845	10,637	127,964	324,564
1870	117,903	8,835	189,500	682,900
1871	125,333	11,150	199,610	795,200
1872	234,810	12,302	210,276	740,500
1873	165,860	18,405	344,300	756,750
1874	167,130	18,010	339,590	757,000
1875	140,000	11,830	243,300	491,500
1876	178,800	12,750	289,900	548,850
1877	185,350	13,120	242,400	545,870
1878	188,600	15,325	282,060	650,400
1879	197,959	16,830	341,450	619,450

The coal trade of the port is immense, vast quantities being brought here for shipment to coastwise ports. *P.* is an important seat of the lumber trade, its supplies coming chiefly from the N. part of the state, and from Virginia and the Carolinas The oysters of Chesapeake Bay and of the New Jersey coast are also the object of an important trade. *P.* is one of the principal markets for peaches and small fruits, and is the only port having a steamship line exclusively in the Mediterranean fruit-trade. Besides its imports from Europe and the West Indies, the imports of Florida oranges are immense, and it is thought that that State will soon ship 100,000 boxes every year. *P.* is one of the three great centres of the book-trade, and here are published 20 daily, 48 weekly, and 53 monthly and other periodicals. Among its most influential commercial institutions must be quoted the Board of Trade, the Commercial Exchange, and the Clearing-house. *P.* has 31 national and state banks, with an aggregate capital of about $20,000,000. A considerable amount of capital is also employed in the fire, marine, and life insurance business.

Manufactures. The vicinity of *P.* abounds with water-power of great magnitude, and the proximity of the coal and iron fields of W Pennsylvania affords also great manufacturing facilities, which have been made extensively available. According to the U States census of 1870, *P.* was at that time the first city in the Union in the number of manuf. establishments and of hands employed, and in the value of materials used; being surpassed only by New York in the value of manufactured products. Since that time, this branch of the industry of *P.* has been developed to an unprecedented example, and forms now the largest business interest of the city. A statement made in 1880 by the Hon. Lorin Blodget, of that city, and quoted in the new edition of "Lippincott's Gazetteer," is as follows: "The aggregate capital invested in manufactures is $250,000,000 (against $174,000,000 in 1870); hands employed, 220,000; amount paid in wages, $88,000,000; value of a year's product, $500,000,000. The textile industries employ more than 70,000 persons, and produce more than $85,000,000, distributed about as follows: carpets, $18,000,000; hosiery, $16,000,000; worsted and woollen yarns, $10,000,000, silk and mixed goods, $5,000,000, cotton fabrics, $18,000,000; woollen and mixed fabrics, $18,000,000. The other leading manufactures, taking $500,000,000 as the aggregate production, are as follows: iron and steel $30,000,000; machinery, $10,000,000; sugar refined, $18,000,000; house-building materials, $10,000,000; boots and shoes, chemicals, and brewery-products, $12,000,000 each; hardware and tools, household furniture, and gold and silver ware, each $8,000,000 A great number of other branches of manufacture produce respectively from $3,000,000 to $6,000,000 each."

Shipping and ship-building. *P.* is the port of entry of a customs-district, which includes the city of Camden, N. J., and all the Pennsylvanian shores of the Delaware and its tributaries. To this district belonged in 1880, 979 vessels of 209,526 tons, of which 651 (tonnage 125,104) were sailing-vessels, 262 (tonnage 74,676) steam-vessels, 37 (tonnage 5,043) canal-boats, and 29 (tonnage 4,701) barges. The number of entrances in the foreign trade during the year 1879 was 1,840, tonnage 1,315,649 (of which American 590 of 462,548, Foreign 1,250 of 1,014,129 tons); clearances 1,624, tonnage 1,221,048 (of which American 445 of 267,129 tons, and Foreign 1,179 of 953,919 tons). The number of entrances in the coastwise trade was 1,064 of 551,336 tons; clearances 1,325 of 740,400 tons. There were built during the same year 6 sailing-vessels of 1,508 tons, 28 steamers of 19,506 tons, 5 canal-boats of 627 tons, and 1 barge of 221 tons; total, 40 vessels of 21,863 tons in aggregate. Of the steamers built, 15 of 17,318 tons were iron. The two chief seats of ship-building in the customs district are Kensington in *P.*, and Chester.

Communications. *P.* is connected with New York and the West by the Pennsylvania railroad; with different points in the state of Pennsylvania by the Philadelphia and Reading, the Germantown and Norristown, the North Pennsylvania, and the West Chester and Philadelphia railroads, and the Philadelphia and Erie division of the Pennsylvania railroad; and with the South by the Philadelphia, Wilmington, and Baltimore, and the Philadelphia and Baltimore central railroads. By ferry to Camden, N. J., communication is had with the Camden and Amboy division of the Pennsylvania railroad, for South Amboy; with the Camden and Atlantic railroad, for Atlantic City, with the Camden, Mt. Holly, and Pemberton railroad, for Long Branch; and with the West Jersey railroad, for Bridgeton, Salem, and Cape May. There are numerous regular lines of steamers to southern and almost all other coastwise ports, a fortnightly line to Havana and New Orleans, a weekly line to Antwerp, and the American weekly line to Liverpool, whose steamers are the only ones carrying the national stars to the shores of Europe.

Philadelphia and Erie R R. runs from Sunbury to Erie, Pa., 287.49 m. This Co., whose office is in Philadelphia, was chartered in 1837, and the road, opened in 1864, is rented for 999 years to Pennsylvania R.R. Co., which pays to the lessor Co. the actual net receipts. Capital stock, $6,053,700, preferred stock, $2,400,000, funded debt, $17,656,000, floating debt (in 1879), $1,330,539.

Philadelphia and Reading R.R. See the Appendix.

Philadelphia, Germantown, and Norristown R.R. runs from Philadelphia to Norristown, 17 m; branches, 12.25 m. This Co., located in Philadelphia, was chartered in 1831, and the road, opened in 1835, is rented for 999 years to the Philadelphia and Reading Co. at annual rental of $269,623. Capital stock, $2,246,900.

Philadelphia, Newtown, and New York R.R. runs from Newtown Junction to Newtown, Pa., 22 m. This Co., located in Philadelphia, was organized in 1874, and the road, opened in 1878, is operated by Pennsylvania R.R. Co. Capital stock, $1,200,000; first mortgage 7%, $700,000.

Philadelphia, Wilmington, and Baltimore R.R. runs from Philadelphia to Baltimore, 96.32 m.: branches, 15.86 m. This Co., whose offices are in Philadelphia, is the consolidation, in 1838, of several old lines. It operates under lease the Delaware R.R. and branches, 100.50 m., for a rental of 6% on the Co.'s stock and bonds, with one half of the net earnings in excess of 6 per cent. Capital stock, $11,567,750; bonded debt, $2,500,-

000; cost of construction and equipment, $13,026,-536.

Philippine Islands, a group in the N. part of the Indian Archipelago, belonging to Spain, between lat. 5° 32′ and 19° 38′ N., lon. 117° and 127° E. These islands are very numerous; the two principal are Luzon and Mindanao. The surface is generally volcanic, the soil fertile, and the climate variable, though not subject to intense heat, the temperature in the hot season averaging 82°. The principal productions are rice, cotton, coffee, sago, tobacco, indigo, hemp, cocoa-nuts, cinnamon, and fruits. The mountains afford excellent timber, and there are pearl fisheries along the coasts. Total area, 65,100 sq. m.; total pop., 7,450,000, of which Luzon has 4,540,000.

Manila, or MANILLA, the capital of the Philippine Islands, and one of the great emporiums of the East, in the island of Luzon, lat. 14° 36′ 8″ N., lon. 120° 53½′ E. It is built on the shore of a spacious bay of the same name, at the mouth of a river navigable for small craft for about ½ m., but for the bridges at a distance of about 150 yards from its mouth. The bar, on which there is generally a depth of from 11 to 12 feet of water, is the only obstacle to vessels of 2,000 tons and upwards loading close up to the first bridge. The principal depots for exports are situated in the space between this bridge and the entrance to the river. Merchant vessels anchor in Manila Bay, but the Spanish war vessels and those carrying coals to the arsenal anchor at Cavita, about 7 m. to the S., where there is a good harbor, well sheltered from the W. and S. W. winds, to which the bay is exposed. The arsenal at Cavita is defended by Fort St. Philip, the strongest fortress on the islands. The city is surrounded by a wall and towers, and some of the bastions are well furnished with artillery. The lights in Manila Bay are, 5 on Burias Island, 2 of which are blue; 1 on the highest point of Corregidor Island, which revolves every minute; 1 on the Islet of Caball; another on the N. shore of the canal; and 1 on Sunghy Point. One of the lights on Burias Island is visible for 20 m. The light on Corregidor Island is 639 feet above high-water mark. Vessels on entering Manila Bay between sunrise and sunset must hoist their national flag under a penalty of 5 dols. to 10 dols. Masters of vessels coming to this port from one where there is a Spanish consul or agent must bring their certificates of cargo or ballast, under a penalty of 300 dollars. — The exports of staple products for three consecutive years were as follows: —

Years.	*Hemp.* peculs.	*Sugar.* peculs.	*Sapanwood.* peculs.	*Cigars.* mil.
1878............	667,378	1,890,259	118,229	109,513
1877............	630,536	1,965,888	77,085	93,454
1876............	630,728	2,093,304	73,768	74,799

Years.	*Coffee.* peculs.	*Cordage.* peculs.	*Indigo.* qqs.	*Hide Cuttings.* peculs.	*Leaf Tobacco.* qqs.
1878............	38,282	12,017	1,525	4,382	133,091
1877............	61,097	11,043	3,277	7,701	192,922
1876............	61,001	7,684	3,569	4,585	148,809

The more important relations are with Spain, Great Britain, the U. States, France, Germany, China, and Chili. The manufactures of Manila consist chiefly of cigars and cheroots, a government monopoly which employs 20,000 workers of both sexes; cordage, the best of which is made by steam machinery; the beautiful fabrics called *piñas*, woven from the fibre of the pineapple leaf, and afterwards exquisitely embroidered; jussi or sinamaio, etc. Our commercial intercourse with Manila is in totality against us. For the year 1879, for instance, we exported nothing to the Philippine Islands, while we imported from them 112,450,478 lbs. brown sugar, valued at $3,895,368; 14,587 tons hemp, valued at $1,459,810; and indigo, valued at $57.000. — Manila is by law the sole emporium of foreign trade with the Spanish East Indies. Pop. (with suburbs) 180,000.

The moneys, weights, and measures in common use in Manila are authorized by the laws of Spain, but cannot be said to correspond with those of the mother country, inasmuch as in Spain the weights and measures are not the same throughout the kingdom. The moneys current here are specie only. Of gold, the doubloon of Spain, Mexico, and the republics of South America, of full weight, is current at $16, the smaller coins — halves, quarters, and eighths — at their proportionate value. Of silver, the dollar of Spain, Mexico, and the other South American republics, of full weight, is current at $1, U. States currency. The relative smaller coins pass at their relative value. Copper coin is of three sizes: 1 cuarto, 2 cuartos, and 4 cuartos; 160 cuartos are equal to a dollar. Accounts are kept by Spanish merchants in dollars, reals, and cuartos; 20 cuartos equal one real; 8 reals equal one dollar. Foreigners generally keep their accounts in dollars and cents. The value of these coins is about the same in the U. States as here; but not being fixed by the U. States laws, there is a fluctuation which cannot be reduced to regular limits.

The weights in common use are peculs, quintals, arrobas, and pounds. The pound is about 1¾ per cent heavier than that of the U. States. 25 pounds equal 1 arroba, or, at the U. States standard, about 25½ pounds: 4 arrobas = 1 quintal = 101¾ lbs.; 5½ arrobas = 1 pecul = 140 lbs. The measures are long measure — inches, feet, yards, fathoms, miles, and leagues. 12 inches make 1 foot; 3 feet make 1 yard; 2 yards make 1 fathom; 1111 fathoms and 6 inches make 1 m.; 3 m. make 1 league. The yard (or vara) in use here is about 33 inches of the U. States. Grain is usually sold in the country by the cavan. 4 apatanes equal 1 chupo; 8 chupos equal 1 ganto; 25 gantos equal 1 cavan. These differ, however, in the different provinces. In Manila, a cavan of rice weighs 127 lbs.; of coffee, about 52 lbs.; of wheat, about 150 lbs.; a tinaja of oil contains 16 gantos; of wine, 17 gantos.

Phœnix, a fire-insurance Co., located in Hartford, Conn., and incorporated in 1854. *Statement,* Jan. 1, 1880: Cap. stock paid up, $1,000,000; net surplus, $874,504. Risks in force, $131,348,030; premiums, $1,495,131. Premiums received since the organization of the Co., $22,913,946; losses paid, $13,718,617; cash dividends paid to stockholders, $2,320,000.

Phœnix Mutual Life Insurance Co., located in Hartford, Conn., organized in 1851. *Statement,* Jan. 1, 1880: Assets, $10,647,177; liabilities, $9,-643,270; new policies, 1,895, amounting to $2,157,-164. Policies in force, 22,672, amounting to $35,088,551; premiums, $1,054,526. Paid to policy-holders, $1,401,713.

Phonography, the art of expressing sounds by peculiar abbreviated characters or types.

Phosphate, a salt formed by the combination of phosphoric acid with metallic, earthy, or alkaline bases. Examples of the uses of the phosphates in the arts will be found mentioned under the names of many of the metals and alkalies.

Phosphate of Lime, a salt obtained from bones; a combination of phosphoric acid and lime. See MANURE.

Phosphoric Acid, an acid formed by the combustion of phosphorus, and also made by heating bones in a furnace to whiteness, and by distilling phosphorus with nitric acid, or with sulphuric acid, or chlorine. It is combined with sulphur in dipping lucifer matches.

Phosphorus, an elementary substance, of a light amber color, and semi-transparent; but, when carefully prepared, nearly colorless and transparent; when kept some time, it becomes opaque externally, and has then a great resemblance to white wax. It may be cut with a knife, or twisted to pieces with the fingers. It is insoluble in water; its sp. gr. is 1.77. When exposed to the atmosphere, it emits a white smoke, and is luminous in the dark. When heated to 148° it takes fire, and burns with a very bright flame. When *P.* is inflamed in oxygen, the light and heat are incomparably more intense, — the former dazzling the eye, and the latter cracking the glass vessel. The chief employment of *P.* is for tipping lucifer matches. The red or *allotropic P.* is less dangerous for this purpose than the common, or *amorphous.* The quantity of *P.* used for matches amounts literally to hundreds of thousands of pounds annually, small as is the bit that tips each match. *Imp.* duty, 20 per cent.

Photo-Engraving, a general name applied to all processes in which photography draws the picture, and some of the various kinds of engraving fix it on a plate. See PHOTO-LITHOGRAPHY.

Photograph, a picture obtained by photography.

Photographer, one skilled in the art and manipulations of photography.

Photographic Paper, a chemically prepared

paper, brushed with a solution of nitrate of silver, for receiving and fixing sun-impressions.

Photographometer, an instrument for determining the sensibility of each tablet employed in the photographic process, in respect to the amount of luminous and chemical radiation.

Photography, the process of taking fac-simile impressions on paper, by the influence of light upon salts of silver.

Effects produced by chemical changes to which the rays of the sun give rise are matters of common observation. The fading of the color in the portions of a fabric which are exposed to the light is a familiar instance; and the bleaching of linen under the influence of sunshine in the presence of moisture is a well-known operation. Decompositions produced by light in certain compounds of silver soon attracted the attention of chemists, and the remarkable activity of the solar rays in causing the combination of hydrogen and chlorine gases has been even made the means of measuring the intensity of light. When equal volumes of these two gases are mixed together in the dark, they may be kept for an indefinite period without change, provided only that the mixture be preserved from access of light. But the instant it is exposed to the direct rays of the sun, or to an intense light, such as that of burning magnesium, the two gases suddenly unite with a loud explosion, in which the glass vessel containing them is shattered into atoms. The product is an intensely acid invisible gas, called hydrochloric acid; and if the mixture is exposed to the diffused light of day, instead of the direct rays of the sun, then the production of hydrochloric acid will take place gradually, and with a rapidity depending on the intensity of the light. Of vastly more importance than the small operations of the laboratory and the bleach-field are the changes which the sun's rays silently and unobtrusively effect in the vegetable world. The chemical effect of light here appears to reside in its power of separating oxygen from substances with which it is combined. The green parts of plants absorb from the atmosphere the carbonic acid gas, which is constantly produced by the respiration of men and animals, and by combustion, and other processes. Under the influence of sunshine, this carbonic acid is decomposed within the tissues of the plant; the oxygen is restored to the atmosphere; the carbon with which it was united is retained to build up the structure of the plant. In a similar manner light separates the oxygen from the hydrogen of water, and the former gas is given off by the leaves, while the hydrogen enters into the composition of the plant. The carbon, which forms so large an element in the food of plants, is chiefly obtained in this way; and the abundance of the supply of oxygen thus thrown into the atmosphere may be inferred from the fact that a single leaf of the water-lily will in the course of one summer give off nearly eleven cubic feet of oxygen. But for this continual restoration of oxygen to the atmosphere, animal life would soon disappear from the face of the earth. It is the office of the vegetable world not only to furnish a supply of organic matter as food for animals, but when the materials of that food have been converted into oxidized products in the animal system, and returned to the atmosphere as carbonic acid and aqueous vapor, the sunshine, acting on the vegetable structure (chiefly on the delicate tissue of the leaf), tears apart the oxygen and the other substance. These are, therefore, once more capable of combination, by which they may again supply the animal with heat and the other energies of life. — Those actions of light which have been last referred to are called by the chemist *reducing actions*, a term which he applies to the cases in which a compound is made to part with its oxygen or other similar element; when the remaining ingredient is a metal, the operation by which the other has been removed is always called *reduction*. On the other hand, the inverse operations by which oxygen, chlorine, etc., are fixed upon other bodies, are distinguished as processes of *oxidation*. Light is the means of determining each of these kinds of changes, according to the conditions and the nature of the substances exposed to its action. Thus moist chloride of silver will retain its white color if preserved in the dark; but if exposed to sunlight, it quickly acquires a violet tint, which deepens in intensity until it has become black. The dark color is due to *reduced silver;* for it is known that the metal in the state of fine division has this appearance, that during the process the compound gives off chlorine, and that when nitric acid is poured upon the darkened matter, reddish fumes are given off, exactly as when the acid acts upon pure silver. The use of silver nitrate as a marking-ink for linen depends upon a similar reduction of the metal within the fibres; and the same reduction takes place when to a solution of the nitrate in water organic matter is added. If a piece of white silk be dipped into a solution of chloride of gold, and exposed to the sun's rays while still wet, the silk becomes first green, then purple, and finally a film of metallic gold will be found overspreading its surface. Many other chlorides and analogous compounds are similarly affected by sunlight. On the other hand, chlorides, as we have already seen, and oxygen, fix on hydrogen and on organic substances with greater energy under the influence of light. A large series of chemical compounds are obtained by means of the augmented affinity of chlorine for hydrogen induced by the rays of the sun.

It was in availing himself of an action of the latter class that, in 1813, Joseph Nicéphore Niepce, a French artist, established *P.*; for he was the first to obtain a permanent sun-picture. The process of Niepce, which was termed *heliography*, was conducted by smearing a highly polished metallic plate with a certain resinous substance known as "bitumen of Judæa," and this was exposed to the image formed in the *camera obscura* for some hours. The action of the light was such, that the resin, which before exposure was soluble in oil of lavender, became insoluble in that substance. Hence, on treating the plate after exposure with that solvent, only the deep shadows dissolved away, the lights being represented by the undissolved resin. The brightly polished parts of the plate, which were uncovered by the removal of the resin, appeared dark when made to reflect dark objects, while the resin remaining unchanged on the plate appeared light in comparison. — In 1826, another French artist, named Daguerre, who had already made some reputation as a painter of dioramas, entered into a sort of partnership with Niepce, into whose process he introduced some improvements; but, dissatisfied with the slowness of this proceeding, he invented a process of his own, by which pictures of great beauty could be produced with all the shadows, lights, and half-tints faithfully rendered; while the time of exposure in the camera was reduced to twenty minutes. In this process the burnished surface of silver formed the shadows. A plate of copper, coated with pure silver, had the silvered surface polished to the highest degree, and it was then exposed to the vapor

of iodine until a thin yellow film had been produced uniformly over the silver. It was then placed in the camera; and, although when withdrawn no image was perceptible, a latent image was nevertheless present; for when the plate was exposed to the vapor of mercury, that substance attached itself to the parts of the plate in proportion as they had been acted upon by the light. Means were adopted by Daguerre for fixing the picture; and after his processes had been made public in 1839, several important improvements were proposed by other persons. By using bromine as well as iodine the sensitiveness of the plates was so much increased that the time required for exposure was reduced to two minutes, so that about the year 1841 portraits began to be taken by this process. — But Daguerre's process had no sooner been brought to perfection than it began to be supplanted by a rival method. In 1841, Fox Talbot, an Englishman, obtained a patent for a process he called the *Calotype*, but which, in his honor, has since been known as the Talbotype. A sheet of paper is soaked, first in a solution of nitrate of silver, and then in one of iodide of potassium, by which it becomes covered with iodide of silver; it may then be dried. It is prepared for the camera by brushing it over with a solution of gallic acid containing a little nitrate of silver. By this last process its sensitiveness is greatly increased, and an exposure in the camera for a few seconds, or minutes, according to the power of the light, suffices to impress the paper with a latent or invisible image, which reveals itself when the paper is treated with a fresh portion of the gallic acid mixture. The Talbotype is the foundation of the methods of *P.* now in general use; but, before we describe these, it may be proper to mention some other substances which have been found sensitive to light, and to discuss the nature of the invisible images which are first produced in these processes. — The *art* of *P.* has outstripped the *science* — in other words, the nature and laws of the chemical actions by which its beautiful effects are produced are not yet clearly understood, and some quite recent discoveries seem to show that we have yet much to learn before a complete theory of the chemical action of light can be proposed. Some results which have been established may be mentioned, as they show those curious effects of light to be more general than would be supposed from a description of photographic processes dependent on silver salts only. It has been found that certain acids, certain salts, and certain compounds containing only two elements — of which one is a metal — have a tendency to split up, or resolve themselves into their several constituents, when exposed to the action of light. On the other hand, chlorine, bromine, and iodine exhibit, under the same conditions, an exalted affinity for the hydrogen of organic matters. These tendencies concur when the compounds above referred to are associated with organic materials, as in *P.* Solution of nitrate of silver is blackened when it is exposed to light on a piece of paper which has been dipped into the solution; but a piece of white unglazed porcelain similarly treated shows no change. A solution of nitrate of uranium in pure water is not changed by light; but a solution of the same salt in alcohol becomes green, and deposits oxide of uranium. The reducing action of the light is insufficient of itself to accomplish the decomposition of the salt in the first case; but the presence of the organic matter determines this decomposition in the second case. Bichromate of potassium is by itself not easily decomposed by light; but when it is mixed with sugar, starch, gum, or gelatine, the sunbeams readily reduce it. It is remarkable that the gelatine, gum, or starch becomes insoluble by thus taking up oxygen, and the gelatine loses its property of swelling up in water. We shall presently see the advantages which have been drawn from these circumstances. — It is not necessary that the light should act upon both the organic substance and the oxidizing substance at the same time. If paper impregnated with iodide of silver and gallic acid be placed in the camera, the image soon appears; but if, as in the Talbotype, the iodide of silver only be acted upon by the light, no image is perceptible on withdrawing the paper from the camera. The action of the light has nevertheless imparted to the silver salt a tendency to reduction; for when the paper is afterwards dipped into a solution of gallic acid, the image immediately appears. In order to distinguish these two actions, the substance which receives and preserves the latent impression from the light is called the *sensitive* substance, and that which reveals the latent image is termed the *developing* substance. A considerable number of substances having this relation to each other have been observed, and the following table of instances — cited by Niepce de Saint-Victor, the nephew of the original inventor — will give some idea of their variety: —

Sensitive Substances in the paper exposed to the action of the light.	Developing Substance.	Results.
None, *i. e.*, plain paper.	A salt of silver.....	Black image
Nitrate of silver, or iodide of silver	Gallic acid, or sulphate of iron......	Black image.
Nitrate of uranium,...........	Water	By prolonged action of light, a gray image of protoxide of uranium; the image disappears when paper is kept in the dark, but shows itself again in the light.
	Red prussiate of potash..........	Intensely red positive image; becomes blue by sulphate of iron.
Nitrate of uranium and tartaric acid.	Nitrate of silver, or chloride of gold...	Unchangeable images — resembling those of ordinary photographs.
Chloride of gold	Nitrate of uranium, sulphate of iron, sulphate of copper, bichloride of mercury, salt of tin.	. . . .
Gallic acid.......	Sulphate of iron..	Blue-black image.
	Red prussiate of potash.........	Blue image.
Red prussiate of potash.	Water, bichloride of mercury, gallic acid, salt of silver, salt of cobalt.	Blue image, hastened by acids and by heat.
Bichloride of mercury.	Protochloride of tin, soda. potash, sulphide of sodium.	. . . . . .
Chromic acid, or bichromate of potash.	Salts of silver........	Purple-red positive image.
Starch	Blue litmus.......	Red image.
	Iodide of potassium	Reddish brown image.
	White indigo......	Blue positive image.
	Campeachy wood..	Red positive image.

These are only a few of the instances in which actions of this kind have been observed. It is remarkable that the order of the first two columns in this table may be inverted without changing the result. Thus, instead of exposing iodide of

silver to the light and developing the image with gallic acid, one may expose a paper saturated with gallic acid solution, and develop with iodide of potassium and nitrate of silver. The first reaction noted in the table deserves some remark: it is not peculiar to paper, but is common to most organic materials, such as albumen, collodion, starch, fabrics, and indeed to organic matters in general, provided they are not of a black color. Tartaric acid, sulphate of quinine, and nitrate of uranium increase this sensibility. The paper which has been impressed preserves its undeveloped image for a prolonged period if kept in darkness; and it has been found that one piece of paper can impart the image to another by simple contact in the dark. What is still more remarkable, the invisible impressions on a piece of paper may be transferred to another not in contact by merely placing it opposite the first, and separated by an interval of a quarter of an inch. No satisfactory explanation of these phenomena has been advanced, but many conjectures have been made. One of these supposes that some unknown intermediate products are formed, which are, in the case of the latent image on paper, very oxidizable; but in the case of silver salts, etc., very reducible, so that the addition of a silver salt in the first case, and of organic matter in the second, only completes the phenomena by ordinary chemical action. Niepce de Saint-Victor, however, found that a surface of freshly broken porcelain alone will receive a latent impression from light, and will reduce in those places sensitive salts of silver. He believes that the light in these latent images is simply stored up, and that its energy remains fixed to the surfaces until the occasion of its producing a chemical action. — It has been found that when a daguerreotype plate which has been impressed by the light in the camera is afterwards exposed to the red or yellow rays of the spectrum, it loses its property of condensing the mercurial vapors. This destruction of photographic impression by red or yellow light has a practical application of great importance, for it permits the processes of preparing paper and plates to be carried on in a laboratory lighted by windows having yellow or red, instead of the ordinary colorless glass. Thus we see that it is by no means the whole of the solar rays which are concerned in producing photographic images; nay, there are some which even tend to destroy the impressions produced by others. The fact that it is not the light, but only certain rays in the sunbeam, may be proved very conclusively by an experiment with a glass bulb filled with a mixture of equal volumes of hydrogen and chlorine gases. When such a bulb is exposed to the light of the sun or of burning magnesium, which is made to reach it by passing through a piece of *red* glass, no explosion takes place; but if the bulb be covered only with a piece of *blue* or *violet* glass, the explosion is produced just as quickly as if it were exposed to the unaltered rays. — The *spectrum*, or prolonged colored image of the sun, is red at the downward end, where the rays are least refracted, and violet at the other extremity, where the refraction is greatest, while in the intermediate spaces, yellow, green, and blue pass by insensible gradations into each other. But the visible spectrum is far from constituting the only radiations which reach us from the sun. For invisible beams of heat, less refrangible than the red rays, are found beyond the red end of the spectrum; and another invisible spectrum stretches far beyond the violet end, formed of rays recognized only by their chemical activity. It is these which effect photographic actions, and though they are in part more highly refrangible than any of the rays producing the visible spectrum, a large portion are refracted within its limits, so that the maximum of photographic action in a spectrum is usually near the violet end. When we wish to examine the spectrum of the heat rays, it is necessary to replace the glass prism by one made of rock salt, for glass absorbs these heat rays. It also intercepts a great part of the most refrangible rays; for when a prism of *quartz* is substituted for the glass one, the spectrum becomes greatly extended at the violet end. The dark Fraunhofer lines which cross the visible spectrum are represented also in great numbers in the invisible spectrum: in photographs of the *ultra violet* rays more than 700 dark lines have been counted. It has been proposed to employ quartz lenses in the photographic camera; but there is reason to believe that the increased transparency of such lenses for the chemical rays would be counterbalanced by certain disadvantages attending the use of quartz. — The beauty of the images which are formed in the camera obscura long ago gave rise to the desire of fixing them permanently. We know how perfectly *P.* has already satisfied that desire, so far as the *forms* are concerned. The very perfection of the results obtained in this direction increases our regret at our inability to fix also the colors, and secure the picture, not in gray or brown tones of reduced silver, but with all the glowing hues of nature. An observation made by Herschel, Davy, and others, seemed at one time to hold out hopes of a possible realization of chromatic photographs. It was noticed that the images developed upon chloride of silver, of the different parts of the solar spectrum, partook somewhat of the colors of the rays which produced them. Edmond Becquerel made a plate of polished silver, placed in dilute hydrochloric acid, form the positive pole of a battery. The plate thus became coated with an extremely thin layer of chloride of silver, which, as its thickness augmented, exhibited the series of colors due to the action of light on thin films. The operation was stopped when the plate had become of a violet color for the second time; it was then washed, dried, polished with the finest tripoli, and heated to 212° F., the whole of these operations having been carried on in the dark. When this plate was exposed for about two hours to the solar spectrum, fixed by proper appliances which counteracted the apparent motion of the sun, the luminous rays were found to have impressed the plate with their respective colors. The yellow was somewhat pale, but the red, green, and violet were exhibited in their true tints. A theoretical explanation has been advanced, which supposes that yellow light, for example, renders the surface of the plate on which it falls peculiarly capable of receiving and transmitting vibrations corresponding to those of yellow light. Just as a stretched cord responds to its own musical note, the modified plate gives back, out of all the vibrations which fall upon it in ordinary light, only those of which it has itself acquired the periodicity. But since the plate has not lost its sensitiveness to take on other rates of vibrations, it receives other impressions, which first weaken and then overcome the former, and, therefore, the color necessarily vanishes. This kind of difficulty seems to be a necessary concomitant of every attempt in this direction; and all the hopes founded on results yet obtained have been disappointed by the rapid fading of the images.

The comparative cheapness and convenience of Talbot's process, and especially the facilities which it afforded for the multiplication of proofs, gave an immense impulse to photographic art. But the irregular and fibrous structure of paper prevented the attainment of the beautiful sharpness of outline and clear definition of detail which the plates of Daguerre presented. Sir John Herschel suggested the use of glass plates coated with sensitive photographic films, and Niepce de Saint-Victor succeeded in fixing upon glass layers of albumen (white of egg) containing the silver salts, a method which is still used to some extent. The art received, however, its greatest stimulus from the improvements which ensued on the application of *collodion* to this purpose. Collodion (κολλα, glue: in allusion to its adhesiveness) is the name which has been given to a solution in ether of gun-cotton, or of a substance nearly allied to it. Its employment was first suggested by Le Grey of Paris. This process has now been tested, for nearly a quarter of a century, by the united experience of photographers all over the world, and it is agreed that it is surpassed by no other, for it secures every quality which a photograph can possess. The minor details of the method can be, and are, infinitely varied; scarcely two experienced photographers will be found working the process in identically the same manner throughout. Before giving an outline of the collodion process, it may be well to say something respecting the chief instrument of photography — the camera. — The ordinary photographic camera is almost too well known to require description. In its simplest form it is merely a rectangular box, in front of which is placed the lens, which slides in a tube, that its position may be adjusted so as to bring

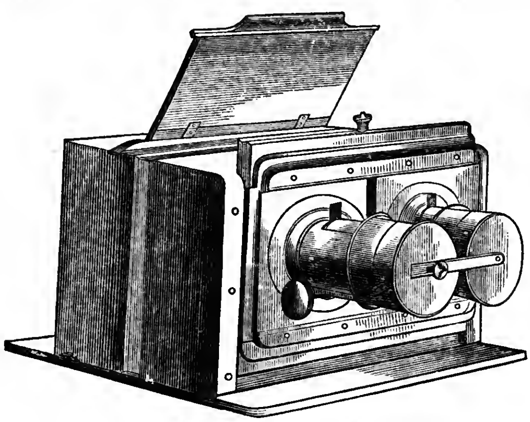

Fig. 396. — Stereoscopic Camera.

the rays to a focus on the surface of a piece of ground glass at the opposite end. This glass is fitted into a light frame which slides in grooves, so that it can be raised vertically out of its position, and replaced by another frame which contains a recess for the reception of the sensitive plate, and a sliding screen which protects it from light until the right moment. When this frame is placed in the camera, the sensitive surface occupies the same position as that of the ground glass, and the sliding screen is drawn up the moment before the operator removes from the front of the lens a cap which he places there after adjusting the focus. The sliding screen is usually made with a narrow strip at the lower part, joined to the rest by a hinge, so that when it has been drawn up it may be retained in its position, and placed out of the way by being folded down horizontally. There is commonly provision for two plates in one frame, the slides, etc., being doubled, and the plates placed back to back. The camera is usually made in two parts, that at the back sliding within the other, so that a wider range for adjustment is obtained, and the same camera may even be used with lenses of different focal lengths. Many improvements have been made in the camera, by which it has been rendered more portable, and capable of more adjustments to suit varying circumstances. Fig. 396 represents a camera for taking stereoscopic views, fitted with two lenses, so that the two views are taken simultaneously on one plate. No piece of apparatus used by the photographer is of so much importance as the lens; for good pictures cannot be obtained without well-defined, sharp images on the sensitive plate, and these images must have sufficient intensity to produce the required amount of chemical action in a short space of time. The formation of an image by means of a lens which is thickest at the centre is tolerably familiar to everybody; for most persons must have noticed that the lens of a pair of spectacles, or of an eye-glass, will produce an inverted image of the window-frame on a sheet of white paper, held a certain distance behind the lens. But the diagrams by which the paths of the rays are usually represented seem to convey a false impression to an ordinary reader, who usually goes away with the idea that somehow three rays are sent off by the object, and that one goes through the middle of the lens, and the other two meet it and produce an image. Let us suppose, that, by means of a circular eye-glass, the image of a window is projected on a piece of white paper: a straight line passing through the centre of the glass perpendicular to its plane will meet the window and image each at a certain point. The point in which it meets the image is the *focus* of *innumerable* rays, which issue from the point in the window; that is, of the whole light sent out in every direction by the point, a certain portion falls upon the lens, and by the refraction it undergoes in passing through it, the rays are again brought together at the point in the image. Thus the original point in the object is the apex of a solid cone of rays (if we may say so), of which the lens is the base, and the point in the image is the apex of another cone, having also the lens as its base. These cones would be termed *right* cones, because their bases are perpendicular to their *axes*, or central lines. But they represent the rays from only *one point* of the object. Let us now consider how the image of another point is formed, say one in the highest part of the object which forms an image on the screen. Those rays which are sent out by this point, and fall upon the lens, form now an *oblique* cone, of which the lens is the base, and the central ray will pass through the middle of the lens and continue its journey on the other side with little or no change of direction, forming also the axis of another oblique cone, constituted of the refracted rays, all of which will meet together at the lowest part of the image. Similar cones of incident and refracted rays, all having the lens as base, and all of them cones more or less oblique, will be formed by the light from each point of the object. Thus, the rays which issue from each point are brought together again in a series of points which have the same position with regard to each other, and collectively form an inverted image. On carefully looking at the image, say of a window-frame, formed by a simple lens, the reader will observe two defects. The first is that the image cannot be made equally clear and well defined at the centre and at the edges; the adjustment which gives clear definition of one part leaves the other with blurred outlines. The second defect, which is best seen with large lenses, consists in colored fringes surrounding the outlines of the objects. This depends upon the unequal refrangibility of the various rays, but it is obviated in *achromatic* lenses, which are formed of two or more different kinds of glass, so adapted that the refracting power of the compound lens is retained, and the most powerful rays of the spectrum are brought to a common focus. Such are the lenses always used in the photographic camera, and the skill of the optician is taxed to so combine them as to obtain, not only the union of the principal rays in one focus, but the greatest possible flatness of field in the image, the largest amount of light, the widest angle without distortion of the picture, and other qualities. — It now remains to describe in a few words the method of P. which is now most generally practised, namely the *collodion process*. The collodion solution is prepared by dissolving one part of pyroxylin (gun-cotton) in ninety parts of ether and sixty of alcohol. The pyroxylin for this purpose may be obtained by steeping cotton-wool for a few minutes in a mixture of nitre and sulphuric acid, with certain precautions which need not here be mentioned. To the solution of collodion is added a certain quantity of iodide of potassium, or of iodide of ammonium; and sometimes other substances also are mixed with the solution with a view of increasing the sensitiveness of the plate when ready for exposure. Some of the collodion solution is poured on a well-cleaned plate of glass, which is placed horizontally; it spreads over the plate, and, the excess having been poured back into the bottle, the evaporation of the liquids leaves the glass covered with a thin, uniform, transparent film, which firmly adheres. The next operation is to render the plate sensitive by means of the "silver bath." This is a neutral solution of nitrate of silver, one part to fifteen of pure water, which is placed in a trough of glass or porcelain. By the aid of a proper support the plate is introduced quickly and steadily into the solution, immediately after the collodion film has been formed on its surface. In two or three minutes the layer of collodion becomes impregnated with iodide of silver, and, when taken out of the bath, the plate exhibits a creamy-looking surface. The operation of sensitizing the plate by the silver bath must be performed in a room to which no light has access, except that which has passed through *red* or *yellow glass*, or a semi-transparent yellow screen. The plate is now ready for immediate exposure in the camera. It is placed in the dark slide, in which it is conveyed to the camera; and there the image of the object is allowed to fall upon it for a time, which varies, according to the intensity of the light and the nature of the object, from 3 seconds to 45 seconds. The slide is withdrawn from the camera, and taken again to the "dark" room, *i.e.*, where only *yellow* or *red* light can

reach it. If the plate be now examined, it will be found to present no trace of an image A latent one, however, exists; and it is developed by pouring over the plate a solution of pyrogallic acid — one part to 480 of water, with commonly a little alcohol and acetic acid added. When it is desired to intensify the image still more, a few drops of the nitrate of silver solution is added to the *developing solution* immediately before pouring it on the plate. When the picture has become sufficiently distinct, it is washed with pure water, and then immersed in a strong solution of hyposulphite of soda. The last operation is termed by photographers "fixing" the picture, and the substance employed in it is invaluable to the art. It acts as a ready solvent of all the salts of silver which remain on the plate; and the discovery of this property of the hyposulphites by Sir J. Herschel, in 1839, marked an era in photography. The picture is then thoroughly washed in cold water, in order that the hyposulphite of soda may be entirely dissolved out. It is then dried, warmed before a fire, and finally the film is covered with a coat of transparent varnish, by which it is protected from mechanical injury. The image here is *negative*, — that is, the strongest lights of the object appear as the darkest tints in the picture, and *vice versâ*. From it any number of *positive* pictures may be obtained by means of the sensitive paper prepared with chloride of silver as in Fox Talbot's plan. — As it is a tedious, and perhaps, in some cases, an impossible operation to completely remove all traces of silver salts and hyposulphites from photographs, they have frequently been found to fade; but this is rarely the case with well-prepared specimens. Processes have, however, been devised by which absolute permanence is secured for the photograph. One of the best of these is known as the *Carbon Printing Process*, and, as improved by Mr. Swan, it is thus practised: A solution of gelatine is colored by the addition of Indian ink, or any other pigment which will give the desired tone. This solution is spread over sheets of paper, which are then dried. In this condition the paper may be preserved for any length of time without any special precautions. When it is required for use, it is floated, with the gelatine-covered side downwards, in a solution of bichromate of potash, and then dried; but these operations must be carried on in the dark. The paper is exposed under a negative photograph, with which its prepared side is in contact. The effect of the light is to render insoluble the gelatine on all those parts on which it has fallen, and this action extends to a depth in the layer proportionate to the intensity of the illumination. The object is, therefore, to wash away all the *soluble* gelatine and the color with which it is mixed; but this soluble gelatine is mainly on the side of the film which is in contact with the paper. The gelatine surface is therefore made to adhere to another piece of paper by means of some substance insoluble in water; and when this has been done, the whole is immersed in warm water. Then the soluble gelatine is soon dissolved; the first paper floats off, and the insoluble gelatine, holding the Indian ink or other coloring matter in its substance, remains attached by the cement. As the thickness of the layer rendered insoluble is in proportion to the intensity of the light passing through each part of the negative, the picture will be presented in all the proper gradations of light and shade.

Photolithography, a photographic process for reproducing designs on stone, from which impressions may be obtained in the ordinary lithographic press. The term, however, is commonly, though abusively, extended to similar processes of reproduction on metallic plates, impressions of which are obtained in the common printing-press.

At the end of the last and commencement of the present century, etching had already acquired high rank among the Fine Arts. But since that period other necessities have arisen. Etching, tedious and costly to print, could not be applied to works of large circulation, and can only be used for those exceptional productions, the fineness and delicacy of which demand special consideration, such as architectural subjects, geographical maps, copies of the great masters, etc. Engraving on wood is much more difficult to execute, because, instead of drawing a line on the varnish which covers the plate of copper or steel, so as to enable the acid to eat away the metal, every portion which the pencil of the draughtsman has touched must be left in relief. Notwithstanding the more tedious labor and the talent required to properly delineate the various shades, this is the species of engraving most employed at present on account of the simplicity of the printing. The block is placed in the text, in the midst of the types, and the impression taken typographically. This kind of engraving has made, during late years, such progress that it rivals etching in perfection, and, although the first cost is much higher, — for an equal excellence, — it is still preferred commercially. The work of typographic engraving has been simplified by eating the metal with an acidulated solution, but in a contrary sense. The drawing is executed with a pen on paper specially prepared, and with a fatty ink, and afterwards transferred by pressure to a sheet of zinc. The mordant spread over the metallic sheet only attaches the places the draughtsman has left free. The result consequently is that a relief is formed on the surface of the zinc, which is afterwards mounted on a block of wood to correspond to the height of the types in the midst of which it is placed. However simple and easy that proceeding may appear, it has the serious inconvenience of producing only a coarse picture on account of the want of fluidity of the ink employed Therefore, its application is restricted to publications in which rapid and cheap reproduction is of more consequence than artistic care. The transformation of ordinary photographic negatives into typographic blocks would be an immense progress if it could be accomplished perfectly. But printing and photography only amalgamate with difficulty. Long since, clever experiments have produced excellent results, but these latter are still far from giving anything like those furnished by photography in the now almost universal method of positive proofs in the salts of silver, which have arrived at an incomparable fineness and delicacy of tone. But also what inconveniences! The printing is only effected by means of complicated manipulations, the proofs are not always of assured durability, and they cost a price which is only admissible in the case of perfection. The Woodbury method is a great improvement, viz.: converting the negative on glass into a metal block. A proof is taken on a sheet of gelatine mixed with bichromate of potassium by the simple action of light; afterwards, that substance, become of a hard horny consistence, is subjected to a strong pressure on a plate composed of lead and antimony on which the hollows and reliefs are accurately reproduced. To print the proofs, an ink, the basis of which is gelatine, is spread over the plate which is then passed through a press; the result resembles in all respects a good positive in salts of silver, because the differences in relief have produced varying thicknesses in the layer of ink. That curious process, introduced in this country under the name of *Photo-relief Printing*, is a notable improvement, since it is a mechanical and not a chemical operation, but the desideratum is heliography, producing a block which can be printed with ordinary printing-ink The obstacles are serious, and efforts have been made to overcome them since the discovery of photography, and only since four or five years has heliography occupied an important place in the art of reproduction Plates of steel, copper, or zinc are employed, the surface of which is perfectly cleaned, and on it is poured a solution of bichromated gelatine, that layer, sensitive to light, is exposed behind a rather hard photographic negative to the rays of the sun in an ordinary press as for a paper proof. The whites allow the gelatine to be acted upon, while the blacks remain intact. An acid is then applied which acts only on the parts affected by the light This method gives a plate in relief, while in etching a copy in reverse has to be taken. In the former case the acid should be allowed to eat in deeply, while in the latter the surface should only be slightly attacked The great difficulty in heliography is the reproduction of the half-tones. The bichromated gelatine is acted upon with an intensity equivalent to that of the negative, but the metal, protected by infinitesimally thin layers, is attacked by the acid uniformly, leaving sometimes a space of white and at others a blotch of black, instead of half-tones, because the relief is at the same level That defect is less sensible in etching because a clever operator is able to graduate the action of the acid, and the slight relief produces in printing the effect of *aqua-tinta*. In order to render all those tones, efforts have been made to cover, mechanically or artificially, the metal plate with granulations which soften the half-tints. That process, if it improves the appearance of the print, does not render faithfully the original, and thus detracts from its merit. The cases of exceptional success by some operators cannot be regarded as having definitively introduced heliography as a branch of commerce. — Bichromated gelatine is also the agent employed in *photolithography*, the image of a negative photograph being thus rendered insoluble in a layer of gelatine spread on the stone, which is acted on by acids, etc, in the usual way, after the soluble portions have been removed by water. As there are also methods of using the lithographic process with plates of zinc instead of stones, so there are processes of impressing the image photographically upon the zinc Of the general nature of the processes of *zincography*, *photolithography*, and *photozincography* the reader will now probably be able to form some idea, but the details need not here be described. The last two, and some other processes for printing photographic effects mechanically, all labor under the defect of imperfectly rendering the *half-tints* of a picture This remark does not apply to the Woodbury process. The photolithographic process gives marvellous results in cases where no gradations are required. Thus a whole page of the *N. Y Herald* may be lithographed in a space not exceeding half of this page, and although the characters may be indistinguishable to the naked eye, a lens will show them perfectly. Similarly, we may obtain within the compass of an octavo page a photolithograph of one of Hogarth's large engravings, which will show every touch of the original artist's *burin*. — There is reason to hope that the time is not far distant when all our tedious mechanical methods of reproducing drawings by wood or steel engravings will be superseded by processes which will give us absolute fac-similes of every touch of the artist's pencil, and when some process, giving all the delicacy and truthfulness of Woodbury's prints, will supply us with faithful transcripts of nature for

book illustration at a cost not exceeding that of the ordinary methods. So far as relates to one style of drawing, these requirements appear to be nearly realized in the process termed the *graphotype*, which reproduces mechanically, in the form of a metal plate with all the lines in relief, a design which the artist has etched on a flat surface. This is effected in the following manner: Chalk is powdered very finely, and sifted through wire gauze having very narrow meshes. A quantity of this is spread upon a smooth plate of metal, and subjected to an intense pressure by means of an hydraulic press. The particles of the chalk cohere into a mass, having sufficient firmness to admit of its surface being drawn upon in the same manner as a block of boxwood. The drawing is effected with an ink composed of lampblack and glue, a finely-pointed camel's-hair brush being employed; but the shades must be produced by lines and strokes as in wood engraving. When the ink is quite dry, the surface is rubbed with a fitch brush or with velvet; and by this brushing the particles of chalk not protected by the inked strokes are loosened and carried off. In a short time the chalk between the strokes becomes quite hollowed out; and when a depth of about one eighth of an inch has been attained, every line remains standing in relief exactly as in an engraved wood block. A strong solution of silicate of potash is then poured upon the chalk, which its chemical action converts into a kind of stone without in any way altering the forms. Although this artificial stone is quite hard, so that impressions may at once be taken from it, yet it is incapable of enduring the wear and tear of the printing-press. Accordingly a mould is taken from it, and this is made, by some of the processes of casting or electrotyping already described, to furnish a metal stereotype plate.

Photometer, an instrument for measuring the intensity of light.

Photo-relief Printing. See PHOTOLITHOGRAPHY.

Phototype, a type or plate resembling an engraved plate, and capable of being printed from in the same manner, produced from a photographic picture by a peculiar process; also the process by which such a plate is produced.

Photozincography. See PHOTOLITHOGRAPHY.

Physician, one who has received the degree of doctor of medicine.

Physic-nut, a name for the seed-capsules of *Curcas purgans* or *Jatropha curcas*, from which is expressed an odorless, colorless, and limpid oil, which burns well, and, when cold, deposits a considerable quantity of stearine. It has the same qualities and uses as the croton-oil, but in large doses is a dangerous poison.

Piano-forte, a well-known and popular stringed instrument played by keys. Considered in relation to its mechanical construction and action, the *P.* is a singularly complex piece of mechanism, owing to the number of small pieces of wood, metal, ivory, leather, etc., which are brought into mutual relation. The predecessors of this beautiful instrument were the clavichord, virginal, spinet, and harpsichord. The *clavichord* was shaped something like a square *P.*, with one string to each key; the inner end of the key carried a small brass wedge which struck the string; and as the string was muffled at that spot, the sound was subdued and somewhat melancholy. The *virginal*, in use in the time of Queen Elizabeth, was nearly like the clavichord in shape, but the inner or hinder end of each key, instead of a brass wedge, carried a small apparatus called a jack, to which a quill or thorn was fixed; and the manner in which this quill struck the string elicited a peculiar kind of sound. The *spinet* was in form something like a harp laid down on its side; it had about thirty brass wires for the lower notes, and twenty steel wires for the upper; each wire was struck by a jack or quill. The *harpsichord* redoubled the power of the instruments above named by having two strings to every key; these two were attuned in unison, and were struck with jacks and quills. The *double harpsichord* was still more complex, having two sets of keys and three sets of strings; one key of one set struck two strings in unison, while one key of the other set struck a string tuned an octave higher. A further change was made by tuning all three strings for one note in unison; but the striking apparatus was still a jack and quill. The *P.* mainly grew out of all these by substituting a hammer for a jack and quill; other changes there were in abundance, but this was the most important, as it affected the quality of every sound produced by the instrument. The hammer recoils after each blow; and the player can greatly vary the loudness and softness (hence the name, *piano-forte*, "soft and loud") of the sound by modifying the pressure with the finger on the key. It was introduced about a century and a half ago, and an incessant series of patented inventions relating to it have gradually brought it to a high degree of perfection. A *square* piano-forte has the keyboard in front of one side; the strings are ranged in a horizontal layer, two to each note. The *upright* or *cabinet* has the strings (usually two, but sometimes three, to each note), placed vertically, with the keyboard about midway of the height. The *cottage* is a modification of the upright, but with shorter strings. The *oblique* has the strings ranged obliquely instead of vertically. The *grand* has a horizontal shape, narrower at one end than the other; the keyboard is at one end; there are three strings to each note, and the instrument has greater power of sound than any other. The *semi-grand* is a shorter variety of the grand. The *boudoir*, *piccolo*, *pianette*, *pianino*, etc., are small and usually cheap varieties of the cottage piano-forte. There has been a gradual tendency to increase the range of the *P.* from 5 to 5½, 6, 6½, and 7 octaves, and there are never less than two strings to a note. In a *P.* every string is fastened at both ends to pegs, in such a way as to afford means for stretching it; it passes over or rests upon bridges, the distance between which determines the length of the vibrating portion of the string. When all the strings of the largest instruments are fully stretched, the strain upon the end pegs, and consequently upon the frame to which they are attached, is something enormous, estimated to amount altogether to not less than 20,000 to 30,000 lbs.; hence the necessity for strongly bracing the wood and iron work of the frame. The upper or finer strings are of steel wire, the lower or thicker ones of brass wire, and some have very fine wire twisted round them, to give additional substance. The sound produced by the strings is augmented by the *sounding board*, a large thin piece of fir or pine, which strengthens or redoubles the tone Each key acts upon a lever, which moves a little wooden *hammer* covered with thick felt or leather, and this hammer strikes the string. If the sound continued long after the removal of the finger from the key, it would interfere with the next note; to prevent this a *damper* is used, a soft substance of felt or leather, which touches the string as the hammer quits it, and damps or chokes the sound. Two *pedals* so act that one of them causes every key to strike on one string only instead of two, or on two instead of three, to lessen the sound; while the other temporarily shifts the dampers aside, so as to produce a more ringing, brilliant effect in some particular musical passages. These several bits of mechanism give great complexity to the interior of a *P.*, especially to what is called the *action*; that is, all the moving parts between the keys and the strings. It might be supposed that the same key will produce the same tone by whomsoever it is pressed down; and so it does in regard to *pitch*, but not in *timbre* or *quality*. Every great player has his own particular *touch*, or mode of pressing with the finger, and requires a

peculiar *action*, or mechanism between the keys and the strings, to enable him to give effect to his favorite touch. Hence the numerous inventions in Europe by Erard, Broadwood, Collard, Wornum, Zeiter, Hopkinson, Stoddart, Tomkinson, etc., and in America by Chickering, Steinway, Weber, and other great workers, to increase the delicacy of these small bits of mechanism, enabling the player to produce lighter shades of effect which in former days would have been unattainable. — The upright *P.* is the form most common in England, the square in the U. States. Several American firms, however, have made the manufacture of upright *P.* a specialty, among them George Steck, Decker Brothers and Albert Weber of New York, and Knabe & Co. of Baltimore. *P.* are now manufactured in several parts of the Eastern and Western States, but the most prominent firms are in New York, Boston, and Baltimore. Messrs. Chickering and Sons, and Steinway and Sons have the two largest manufacturing establishments in the world. The square *P.* of the U. States surpass by far, in workmanship and perfection of tone, those of any other country. It has won the highest rewards at the Paris exhibitions of 1867 and 1878, and is now extensively exported to Europe and South America.

The first *P.* manufactured in America was exposed for sale in Boston on April 15, 1823, by Jonas Chickering, the founder of the great house of Chickering and Sons, of Boston and New York.

The value of our exports of *P.* for the year 1879 was $320,669. *Imp.* duty, 30 per cent.

Pianoforte Fret-Cutter, a maker of the open, ornamental wood-work for the front of an upright piano.

Piano-Stool, a round-seated stool, which can be elevated or depressed to accommodate the performer.

Piassaba, or PIASSAVA, the footstalks of a South American palm, the *Attalea funifera* (see Fig. 103), an important article of commerce in Brazil, and shipped from Para and Bahia to this country as a cheap substitute for bristles for making brushes, etc.

Piastre, the dollar of exchange in Spain, where it is also called the peso de plata; an imaginary money, estimated at 8 reaux old plata, or 15 reaux 2 maravedis vellon; and as the hard dollar is worth 20 reaux vellon, the piastre is equivalent at par to about 78 cents. The piastre, or piece of eight, was formerly a silver coin worth $1.12, being, in fact, the old dollar. Also a coin and money of account of variable value in Turkey, Tunis, the East Indies, and South America. Accounts are kept in Alexandria in piastres of 40 paras, and 100 paras are worth about $4.85.

Pica, a printing-type, larger than long primer, of which there are several kinds cast, as large and small, four line, fourteen line, twenty line, double, and double small.

Picayune, the old Spanish half-real, a silver coin equal to 6¼ cents. The term popularly applied in Louisiana to express 5 cents.

Piccalilli, an imitation Indian pickle of various vegetables, with pungent spices.

Piccolo, a small pianoforte; a small flute.

Pice, an East Indian copper coin, an inch in diameter, and weighing 100 grains troy, and the value of $\frac{1}{64}$ part of the E. I. Co.'s rupee; also a very minute weight, varying in different localities from 156¼ to 276½ grains.

Pichurim Beans, a name for the isolated lobes of the drugs of *Nectandra Pichury;* the sassafras nuts of commerce.

Pick, to choose or select, — to have the pick; that is, the privilege of selecting or making choice.

Picker, a cotton-cleaner; a machine for separating fibrous substances; any instrument or contrivance to pick or separate with.

Picker-Bends, pieces of buffalo hide, lined, but not tanned or otherwise dressed, used by power-loom weavers, who attach them to the shuttle.

Pickets, stakes or narrow boards, used for fencing.

Pick-Hammer, a pointed hammer for dressing granite.

Picking, the process of cleaning cotton; that is to say, of opening the tussucks of bale-cotton, reducing it to a more fleecy condition, and separating from it dust, dirt, burs, and other refuse. Machines for this purpose are of very variable construction, less uniformity existing in this department than in any other of the series of operations in cotton.

Pickings, cullings. — Pounded oyster-shells for gravel walks. — Hard burnt bricks. — Perquisites, or the gainings not legitimately earned in trade.

Pickled, preserved in a solution of salt and water, or in vinegar.

Pickles are various kinds of vegetables and fruits preserved in vinegar. The substances are first well cleaned with water, then steeped for some time in brine, and afterwards transferred to bottles, which are filled up with good vinegar. Certain fruits, like walnuts, require to be pickled with scalding-hot vinegar; others, as red-cabbage, with cold vinegar; but onions, to preserve their whiteness, with distilled vinegar. Wood vinegar is never used by the principal pickle-manufacturers, but the best malt or white-wine vinegar.

To assist the preservation of pickles, a portion of salt is also added, and likewise, to give flavor, various spices, such as long pepper, black pepper, white pepper, allspice, ginger, cloves, mace, garlic, mustard, horseradish, shallots, capsicum. When the spices are bruised they are most efficacious, but they are apt to render the pickle turbid and discolored. The flavoring ingredients of Indian pickle are Curry powder mixed with a large proportion of mustard and garlic. Green peaches are said to make the best imitation of the Indian mango. — Some unscrupulous manufacturers, to give to their pickles a pleasant bright green color, use a salt of copper, which is very poisonous. The presence of copper can be easily detected by putting a finely minced bit of the pickles into a vial containing liquid ammonia diluted with an equal amount of water; the liquid becomes blue if there is copper. *Imp.* duty, 35 per cent.

Pick-Lock, an instrument for picking locks. — A superior description of wool; the picked or selected portions of fleeces of the best quality.

Picture, a painting; though the word is sometimes applied to a print or engraving.

Picture-Book, an illustrated book for children.

Picture-Frame, a setting or frame for a picture, made of different materials, either wood, solid or veneered, leather, papier-mâché, gutta-percha, metal, etc.

Picture-Gallery, a place for hanging or exhibiting pictures.

Picture-Restorer, a restorer of the brightness of colors, etc., in oil paintings.

Picture-Rod, a kind of brass tubing for affixing to the tops of walls in a room to suspend pictures from.

Picul. See PECUL.

Pie, a printer's term for a confused mass of letters or type, broken up by accident.

Piece, a picture. — A play. — A patch. — A part or length of anything, or the whole of variable dimensions. — A piece of muslin is 10 yards, of calico 28 yards, of Irish linen 25 yards, of Hanoverian linen 100 double ells, or 128 yards. — A French term for 220 to 235 litres of wine.

Piece-Broker, a person who buys shreds and remnants of woollen cloth from tailors, to sell again to others who want them, for mending or for other purposes.

Piece-Goods, the articles usually classed under this category are gray cotton, mulls, jaconets, shirtings, madapollans, printers' cambrics, long cloths, sheetings, drills; and also all kinds of dry goods which are woven in lengths suitable to be cut up by the usual lineal measure of the country where they are sold.

Piecing, mending; making additions; joining two things together.

Piece-Work, task-work; work paid for by the job.

Pie-Dish, an oval, flat, deep dish of crockery ware, for baking pies in.

Pier, a projecting quay, wharf, or landing-place; a strong marine erection running out into the sea from the shore on a shallow coast, for the facility of passengers, shipping, etc. — A projection or column on which the arch of a bridge is raised.

Pierage, money paid by ships for the use of a pier or wharf.

Pierced-Work, perforated or filagree work.

Piercel, Piercer, a kind of awl or gimlet for giving vent to casks of liquor.

Piercer, a lady's eyeletteer for fancy-work, made of ivory, bone, pearl, or a porcupine's quill. — An operative in a cotton-mill.

Pier-Glass, a large looking-glass between windows.

Pietra Dura [*It.* hard stone], a kind of mosaic, that depends on the inlaying of hard stone in a slab of marble. These hard stones are pieces of jasper, chalcedony, agate, carnelian, lapis lazuli, etc.

As usually conducted, the work is thus managed: — A very thin film (merely a veneer) of black marble is prepared, and a pattern cut in with saw or file — pieces being cut out as large as the hard stones to be inserted. These stones, shaped by lapidary processes, are accurately fitted into the spaces thus prepared. After this inlaying, the slab is veneered on a thicker slab, and is then finished. All polishing is done before the inlaying; because, if polished afterwards, the soft marble would be more worn away than the hard stone, and the surface would be uneven.

Piezometer, an instrument for measuring the compressibility of liquids.

Pig. See Hog.

Pig, a large oblong mass of unforged metal, as run from the smelting-furnace; an ingot of iron or lead, weighing ¾ to 1½ cwt. — An earthen pitcher.

Pigeon, a common name for several varieties of birds, several of which enter largely into commerce, both for food and as fancy-birds. The carrier pigeon, formerly so much prized, is now replaced by the electric wires on land and in the sea.

Pigeon-Hole, a receptacle for letters, etc.

Pigment, a paint; any color used by painters.

Pignons, Pinones, the edible seeds of the cones of various pines. Those of the *Pinus pinea* are consumed in Italy. In Chili, they are considered a great delicacy, both by the Indians and Spaniards. They are sometimes boiled, ground down on a stone into a kind of paste, and made into pastry.

Pig-Nuts, a name for a variety of the hickory-tree, *Carya glabra*. The nuts are smaller, and not quite so pleasant as those of the shell-bark variety of hickory. The hog-nut is the *Carya porcina*.

Pig-Skin, the skin of the hog prepared as leather for saddles, binding, or other purposes.

Pig-Tail, a dark kind of chewing tobacco twisted into a long rope or cord, which is afterwards wound into a hard close ball.

Pike, a long lance. — An iron sprig for fastening work to a turning-lathe. — A fresh-water fish, the *Esox lucius;* the sea-pike is the gar-fish, *Esox belone*.

Pilaster, a square column set in a wall.

Pilchard, a small fish resembling the herring, the *Culpea pilchardus*, which is caught in large numbers on the western coasts of England. They are shipped salted to the Mediterranean ports.

Pile, a pole or pointed stake. — A sharpened log of timber driven a considerable depth into the ground, in the bed of rivers, or in marshy land, to build upon. — An erection or superstructure.— The shag, nap, or surface of velvet, plush, broadcloth, etc. — A galvanic battery.

Pile-Driving Machine, a heavy rammer, or mass of iron, raised by a leverage, and descending repeatedly with force by gravity, on the head of a pile or log of wood, to be driven into the earth.

Pill, a medicine rolled into a small globule.

Pillar, an upright column or support of wood, iron, stone, etc.

Pillar-Dollar, a Spanish silver coin with two columns supported by the royal arms on the obverse, which is at a high premium for the Chinese market.

Pill-Box, a small round pasteboard or thin wooden box, made of different sizes for chemists' and apothecaries' use.

Pill-making Machine, a corrugated metal plate for rolling pills on, so as to divide them accurately.

Pillow, a bag filled with feathers to rest the head on the bed, etc. — A name for a kind of plain fustian. See Fustian.

Pillow-Lace. See Lace.

Pillow-Slip, an outer covering or case of linen or calico for a feather pillow.

Pill-Tile, a glazed tile for rolling the pill mass upon with the hand or a spatula.

Pilot. The name of pilot or steersman is applied either to a particular officer, serving on board a ship during the course of a voyage, and having charge of the helm and the ship's route; or to a person taken on board at any particular place, for the purpose of conducting a ship through a river, road, or channel, or from or into a port. It is to the latter description of persons that the term pilot is now usually applied. Masters and mates of merchant vessels, after having passed an examination before legally constituted authorities, and possessing a certificate to that effect, may pilot their own vessels within the prescribed limits for which they have passed, without being liable to any penalty. In all other cases, when a master is by law subject to a penalty for not taking a pilot, he is bound to do so when he has the opportunity; and after the pilot is taken on board, the master has no longer any command of the ship, nor is he responsible for the management of her while she continues in the district for which the pilot is authorized to act. When beyond that district, the master again resumes the government of the vessel, the pilot being then no longer liable, although for his own convenience he may still remain on board. In such case he is only to be considered as a passenger, and is not entitled to any remuneration for whatever service he may choose to perform on the voyage, beyond that for which he was originally engaged; but, should he remain on board at the request of the master, he is entitled, besides his pilotage, to a further remuneration per day or per month, according to the rules of the respective ports, from the day when he has passed the limits of his li-

cense to the day of his return to the port from which he was taken on board. If a master of a vessel in any district within which pilots are appointed to act (usually denominated "Pilots' Water") should, except under the circumstances before stated, refuse the service of a pilot offering to come on board, he immediately renders himself liable to his owners, freighters, or insurers for any damage that may occur to the vessel or cargo, arising from the want of such service. When the law does not compel a master to take a pilot on board, and he nevertheless, of his own discretion, chooses to do so, the pilot is considered to be the servant of the owners, who under such circumstances would be responsible to strangers for the management of the ship during the time he continued in charge. If the master at a foreign port attempt to obtain a pilot and fail, and then, in the exercise of his best discretion, endeavor to enter the port and fail, the insurer is not discharged. If the vessel approach a port in the night, he must make signals for a pilot, and wait a reasonable time for one; and if he attempt to enter the port without one, except in case of extreme necessity, the insurers are discharged. Pilotage constitutes a lien upon the vessel, and may be prosecuted in admiralty. But the pilot must be employed by some person rightfully in possession of the vessel. A pilot cannot recover for piloting into an enemy's port.

An act of the U. States Congress authorizes all States to make their own pilotage laws, and questions under these laws are cognizable in the State courts. No one can act as pilot, and claim the compensation allowed by law for the service, unless duly appointed. And he should always have with him his commission, which usually designates the largest vessel he may pilot, or that which draws the most water. If a pilot offers himself to a ship that has no pilot, and is entering or leaving a harbor, and has not reached certain geographical limits, the ship must pay him pilotage fees, whether his services are accepted or not. As soon as the pilot stands on deck he has command of the ship. But it remains the master's duty and power, in case of obvious and certain disability, or dangerous ignorance or error, to disobey the pilot, and dispossess him of his authority. If a ship neglect to take a pilot when it should and can do so, the owners will be answerable in damages to shippers and others for any loss which may be caused by such neglect or refusal. Pilots are answerable for any damage resulting from their own negligence or default, and have been held strictly to this liability. The owner is also liable on general principles for the default of the pilot, who is his servant. — The laws passed by the U. States concerning pilots are comprehended in the following: August 7, 1789 — "That all pilots in the bays, inlets, rivers, harbors, and ports of the U. States shall continue to be regulated in conformity with the existing laws of the States respectively wherein such pilots may be, or with such laws as the States may respectively hereafter enact for the purpose, until further provision shall be made by Congress." March 2, 1837 — "that it shall be lawful for the master or commander of any vessel coming into or going out of any port situated upon waters which are the boundary between two States, to employ any pilot duly licensed or authorized by the laws of either of the States bounded on the said waters, to pilot said vessels to or from said port; any law, usage, or custom to the contrary notwithstanding."

Pilotage, the authorized fees paid to a pilot for navigating a vessel.

Pilot-Boat, a small strong-built and fast-sailing vessel, belonging to a pilot, employed in beating about the coasts and approaches to ports, awaiting vessels requiring the services of a pilot.

Pilot-Bread, a name for hard or ship biscuit. The whiter or finer kind of sea-biscuit is often called captains' biscuit.

Pilot-Cloth, an indigo blue woollen cloth, used for great-coats, and for clothing of mariners and others.

Pilot-Engine, an engine sent before to clear the line or to attend on a railway train.

Pilot-Jack, a union or other flag hoisted by a vessel for a pilot.

Piment, spiced or honeyed wine.

Pimento. See ALLSPICE.

Pimento-Oil, an aromatic yellow oil obtained from the covering of the fruit of the pimento

Pimple, a name given to calcined copper in a certain state; also called sponge regulus.

Pin, a peg or bolt of wood or metal. — The axis on which the sheave of a block turns. — A short piece of wood for belaying or fastening ropes to in a ship.

Pin, a short piece of wire, headed at one end and sharp at the other, chiefly used by females for fastening articles of dress, etc. It is no longer correct to adduce the pin manufacture, as was formerly done, as an example of minute subdivision of labor, the processes having, one by one, chiefly owing to American ingenuity, come within reach of machinery. The pin machine, as now used in all large establishments, has been described as follows: —

"The pin machine is one of the closest approaches that mechanics have made to the dexterity of the human hand. A small machine, about the height and size of a lady's sewing machine, only stronger, stands before you. On the back side a light belt descends from the long shaft at the ceiling, that drives all the machines, ranged in rows on the floor. On the left side of our machine hangs on a peg a small reel of wire, that has been straightened by running through a compound system of small rollers. This wire descends, and the end of it enters the machine. It pulls it in and bites it off by inches, incessantly, 140 bites to a minute. Just as it seizes each bite, a little hammer, with a concave face, hits the end of the wire three taps, and 'upsets' it to a head, while it grips it in a countersunk hole between its teeth. With an outward thrust of its tongue, it then lays the pin sideways in a little groove across the rim of a small wheel that slowly revolves just under its nose. By the external pressure of a stationary hoop, these pins roll in their places, as they are carried under two series of small files, three in each. These files grow finer toward the end of the series. They lie at a slight inclination on the points of the pins, and by a series of cams, levers, and springs, are made to play 'like lightning.' Thus the pins are pointed and dropped in a little shower into a box. 28 lbs. of pins is a day's work for one of these jerking little automatons. 40 machines on this floor make 560 lbs. of pins daily. These are then polished. Two very intelligent machines reject every crooked pin, even the slightest irregularity of form being detected. Another automaton assorts half a dozen lengths in as many different boxes, all at once and unerringly, when a careless operator has mixed the contents of boxes from various machines. Lastly, a perfect genius of a machine hangs the pin by the head, in an inclined platform, through as many 'slots' as there are pins in a row on the papers. These slots converge into the exact space, spanning the length of a row. Under them runs the strip of pin paper. A hand-like part of the machine catches one pin from each of the slots as it falls, and by one movement sticks them all through two corrugated ridges in the paper, from which they are to be picked by taper fingers in boudoirs, and all sorts of human fingers in all sorts of human circumstances. Thus you have its genesis: —

"'Tall and slender, straight and thin,
Pretty, little, useful pin.'"

The manuf. of pins was commenced in the U. States between 1819 and 1820. Among the first established were those at Bellevue and Greenwich, New York. L. W. Wright of Massachusetts obtained patents chiefly for making solid-headed pins, and commenced the manufacture at Lambeth, London. John J. Howe established in 1836 the Howe manufacturing Co. in New York — afterwards removed to Birmingham, Conn., and patented the first self-acting machine in which the pin was entirely and successfully completed by one process. Samuel Slocum obtained another patent, and in 1838 established a manuf. of pins at Poughkeepsie, New York, the interests of which were later transferred to the American Pin Co., at Waterbury, Conn., one of the leading manufactories of the kind in the U. States. One of the most important improvements of which the manuf. is indebted to America is the machine for sticking the pins in papers, which is its last state of perfection, and, as above described, was patented in about 1860 by Thaddeus Fowler of Connecticut. *Imp.* duty: solid head pins, and others, 35 per cent; gold or silver jewelry pins, 25 per cent; gold or silver, but not jewelry, 40 per cent.

Pina [Sp.], amalgamated silver; pineapple leaf fibres.

Pina-Cloth, an expensive fabric made by the natives of the Philippines from the fibres of the

pineapple leaf, *Ananassa sativa;* the texture is very delicate, soft, and transparent, and generally has a very slight tinge of pale yellow. It is made into shawls, scarfs, handkerchiefs, dresses, etc., and is most beautifully embroidered by the needle.

Pinafore, a child's apron; an outer dress covering.

Pinang-Nut. See BETEL.

Pincers, small tongs, or nippers.

Pinchbar, a lever with a fulcrum foot and projecting snout.

Pinchbeck. See GOLD (DUTCH).

Pincushion, a cushion for sticking pins in for a dressing-table.

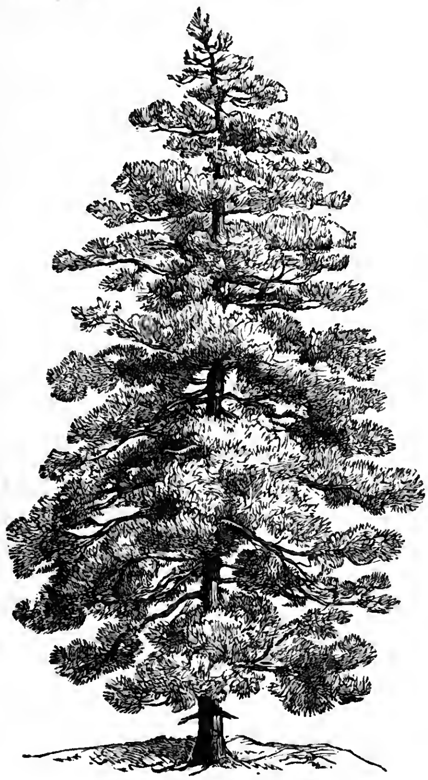

Fig. 397.—RED PINE.
(*Pinus resinosa.*)

Pine, or FIR, a forest tree, next, if not superior, to the oak, in point of utility and value, and of which there are many species. They do not bear flat leaves, but a species of spines, which, however, are real leaves. They are mostly, though not all, evergreens; but the appearance of the tree, as well as the quality of the timber, varies with the species, and also with the situation in which it grows. Generally speaking, the timber is hardest and best in exposed cold situations, and where its growth is slow. The commercial value of *P.* is greater than that of any other wood, and it forms a large portion of the lumber trade. See TIMBER. They all yield resinous matter. See TAR, TURPENTINE. We shall only notice those species the timber of which is most in use in this country and England.

The Black or ***Red Spruce Fir*** (*P. nigra* or *rubra*) grows in the most inclement regions of N. America, especially in swampy valleys having a deep black soil. Its timber — strong, light, and elastic — is of great value. It is employed for the yards of ships, and, in districts where oak is scarce, also for their knees; though apt to split, floors are also occasionally laid with it. The White Spruce (*P. alba*), often found along with it in America, is smaller, and yields inferior timber.

The American White Pine (*P. strobus*), with an erect and lofty trunk, is a native of the N. States and Canada. It grows very fast in sheltered situations and moderately moist sandy soils; and produces the clean, white, soft, but perishable timber, called in America "pine," largely exported in the form of deals both to Europe and the West Indies. It is also much used in shipbuilding.

The Yellow Pine (*P. mitis*) is a fine tree, inhabiting the pine forests of the N. States, yielding timber of great value both for domestic and naval architecture, provided the sapwood is removed. In Great Britain it is regarded as very durable, and in this country it ranks next to

The Southern Pine (*P. Australis* or *palustris*), the best species in the U. States. This tree is a native of Virginia and the Carolinas, where it grows from 60 to 70 feet in height, with a trunk from 15 to 18 inches in diameter for two thirds of its length. It produces light, clear, and durable timber, which is extensively used in shipbuilding, especially for masts; also abundance of tar.

The Common Pine or ***Scotch Fir*** (*P. sylvestris*). — This species, of which there are many varieties, stands in the first rank of forest trees, whether as regards its hardy habits, its rapid growth, or its value in the production of useful timber, the "red deal" of the carpenter. The best is that nearest the root. In Scotland, the fir often acquires a great size, the climate being well suited to it. In England it is chiefly valued as a screen or nurse to other trees. Dense forests of it cover the mountainous tracts of N. Europe, the timber of which, with its resinous products, forms the great staple of many of the Baltic States. The finest is the Norwegian: that shipped from Memel, Riga, and Dantzic is inferior to it, though still good.

The Common or ***White Larch*** (*P. larix*), a native of Switzerland, Russia, and Siberia, grows very erect, with drooping branches, gradually diminishing from the base and giving it a pyramidal form. It grows rapidly, and produces timber of great excellence, both for domestic purposes and shipbuilding: it is equally good throughout its thickness, possessing no sap-wood. The larch also yields "Venice turpentine," and its bark is nearly as valuable as that of the oak.

The Norway Spruce Fir (*P. abies*), which attains a height of 150 feet, constitutes, with larch, the greatest proportion of the vast woods of Norway and Sweden. It is inferior to larch, though durable and of a fine even grain. In the market it is called white or Christiania deal. The tree attains a large size on cold, damp clays, situated on declivities.

The chief other species are the Cedar (see CEDAR and CYPRESS); the Red Pine (*P. resinosa*) of the N. States and Canada (Fig. 397), yielding a fine-grained, strong, durable wood of a close texture; the Corsican Pine (*P. laricio*), a noble tree of S. Europe, extensively used by the French in shipbuilding; and the Silver Fir (*P. picea*), largely grown in S Italy. The Hemlock Spruce Fir of N. America yields wood of little value; but a great deal of the essence of spruce is obtained from its shoots, and its bark is exceedingly valuable.

Pineapple [Fr. and Ger. *ananas*], the most luscious, and perhaps the best, fruit that is produced, is the fruit of *Ananassa sativa* (Fig. 398), a stoneless plant, with rigid, re-curved, channelled and spinous leaves. The fruit is called in botany a *serosis*, and consists of a union of the ovaries, floral envelopes, and the succulent axis of the inflorescence, which become pulpy and confluent with each other. The fruit is so acid in the wild state that when eaten it removes the skin from the lips and gums; cultivated, it becomes sweet and richly aromatic. Originally indigenous to the Bermuda Islands, the *P.*, owing to its value as a fruit, and its capability of becoming naturalized, is now cultivated in all parts of the world where it can be grown by natural or artificial means. Ripe *P.* are now transported from the West Indies to Europe in good condition, and this importation has become an extensive trade.

Fig. 398. — PINEAPPLE.

P. are brought to New York and other northern cities from the West Indies and other tropical regions, generally packed in bulk in the hold of the vessels. The fruit being speedily perishable after ripening, the trade in it is comparatively limited, but 20 cargoes or more are entered at New York from Cuba, the Bahamas, Florida, etc.

Pineapple Fibre. See PINA-CLOTH.

Pine-Kernels, the seeds of the stone pine (*Minus pinea*), which are commonly sold in foreign markets as an article of dessert. They taste somewhat like hazel-nuts. See PIGNONS.

Pine-Knots, a name for the cones of pines, large quantities of which are brought down the Mississippi to New Orleans.

Pine Needle-wool, PINE WOOD-WOOL, a fibrous vegetable substance obtained in Prussia by treating the buds and leaves of coniferous trees with a strong solution of carbonate of soda. The fibre is used there for upholstery purposes, such as stuffing for mattresses, intended as a protection against insects, and for wadding; blankets are made with it; and oil and soap are also obtained from it.

Pin-Head, the wire added to the top of a pin.

Pinion, a pivot; a small toothed wheel, connected with, and receiving motion from, a larger one. — The quills from the joint farthest from the body of the wing of the goose or swan, used for making pens, also called "firsts."

Pink, a painter's color, a yellowish or pale red, or light crimson, of which the chief varieties are rose-pink, Dutch, and English-pink. — A garden flower. — A vessel with a round stern and bulging sides, capable of carrying a large cargo. — To slash cloth. — To work in eyelet holes.

Pinker, one who stabs or cuts out flounces, borders, etc., with a machine, for ladies' dresses and shrouds.

Pinking-Iron, a cutting instrument for scalloping the edges of ribbons, flounces, paper for coffin trimmings, etc.

Pink-Root, the root of the spigelia, a plant abundant in the S. W. States, from whence the drug is mostly received. It is packed in bales or casks, and is generally shipped from St. Louis, by way of New Orleans.

Pink-Saucer, a little saucer, containing safflowers prepared with a small portion of soda, and used for painting or coloring small articles.

Pinkstern. See CHEBACCO.

Pinnace, a small vessel used at sea, with a square stern, having sails and oars, and carrying three masts, chiefly employed to obtain intelligence, and to land men, etc.

Pint, a liquid measure, the eighth part of a gallon; a pint of distilled water weighs 1¼ lb. avoirdupois.

Pintle, a pivot-pin, such as that of a hinge. — A long iron bolt to prevent a cannon from recoiling. — On ship-board, the hook or upper half of each hinge by which the rudder is hung. The *P.* projects from the fore edge of the rudder, as the brace into which it works is fastened to the after face of the sternpost.

Pioneer, a settler or colonist who penetrates into the wilderness; a backwoodsman.

Pipe, a wine measure, usually containing 105 (very nearly) imperial, or 126 wine gallons. Two pipes, or 210 imperial gallons, make a tun. But, in practice, the size of the *P.* varies according to the description of wine it contains. — A leather or canvas hose. — A long tube or cylinder of metal, earthenware, or glass for conducting water, gas, steam, etc. When large, water and gas *P.* are called mains, and the smaller ones supply *P.* and services. — A boatswain's whistle. See SMOKING-PIPE.

Table showing how to ascertain the weights of pipes of various metals, and any diameter required.

Thickness in parts of an inch.	Wrought iron.	Copper.	Lead.
1/32	.326	11½ lbs. plate, .38	2 lbs. lead, .483
1/10	.653	23½ " " .76	4 " " .967
3/32	.976	35 " " 1.14	5½ " " 1.45
1/8	1.3	46½ " " 1.52	8 " " 1.933
5/33	1.627	58 " " 1.9	9¼ " " 2 417
3/16	1.95	70 " " 2.28	11 " " 2.9
7/32	2.277	80½ " " 2.66	13 " " 3.383
1/4	2.6	93 " " 3.04	15 " " 3.867

Rule. To the interior diameter of the pipe, in inches, add the thickness of the metal; multiply the sum by the decimal numbers opposite to the required thickness, and under the metal's name; also, by the length of the pipe in feet; and the product is the weight of the pipe in lbs.

1. Required the weight of a copper pipe whose interior diameter is 7½ inches, its length 6¼ feet, and the metal ⅛ of an inch in thickness.

$$7.5 + .125 = 7.625 \times 1.52 \times 6.25 = 72.4 \text{ lbs.}$$

2. What is the weight of a leaden pipe 18½ feet in length, 3 inches interior diameter, and the metal ¼ of an inch in thickness?

$$3 + .25 = 3.25 \times 3.867 \times 18.5 = 232.5 \text{ lbs.}$$

Note. — Weight of a cubic inch of

Lead	equal	.4103	lb.
Copper, sheet	"	.3225	"
Brass, do.	"	.3037	"
Iron, do.	"	.279	"
Iron, cast,	"	.263	"
Tin, do.	"	.2636	"
Zinc, do.	"	.26	"
Water	"	·03717	"

Pipe-Case, a smoker's pocket-case for holding a short meerschaum or clay tobacco-pipe.

Pipe-Clay, an adhesive and plastic unctuous earth, containing about 36½ per cent of alumina with 61½ silica, which is used for moulding clay tobacco-pipes, for making various kinds of earthenware, and as a detergent for scouring cloth. Nearly 20,000 tons are obtained yearly in Devonshire, England. The finest, however, is found in France.

Pi-pi, the legumes of *Cæsalpinia papai*, used as a tanning material, but inferior to divi-divi.

Piping, a kind of cord trimming or fluting for ladies' dresses.

Piping-Irons, fluting-irons.

Pipkin, a small earthen saucepan.

Pippin, a name for some varieties of small choice apples.

Pipsissewa, a wild plant of North America, the *Chimaphila umbellata*, which being diuretic, acrid, and narcotic, is used in medicine.

Piqué [Fr.], marcella; a cotton stuff used for waistcoats.

Piquette [Fr.], sour acid wine; a drink made in France by pouring water on the husks of grapes.

Piracy is the same offence at sea with robbery on land; and all the writers on the law of nations, and on the maritime law of Europe, agree in this definition of piracy. Pirates have been regarded by all civilized nations as the enemies of the human race, and the most atrocious violators of the universal law of society. They are everywhere pursued and punished with death; and the severity with which the law has animadverted upon this crime arises from its enormity and danger, the cruelty that accompanies it, the necessity of checking it, the difficulty of detection, and the facility

with which robberies may be committed upon pacific traders in the solitudes of the ocean. Every nation has a right to attack and exterminate them without any declaration of war; for though pirates may form a loose and temporary association among themselves, and re-establish in some degree those laws of justice which they have violated with the rest of the world, yet they are not considered as a national body, or entitled to the laws of war, as one of the community of nations. They acquire no rights by conquest; and the law of nations, and the municipal law of every country, authorize the true owner to reclaim his property taken by pirates, wherever it can be found, and they do not recognize any title to be derived from an act of piracy.

By the Constitution of the U. States, Congress is authorized to define and punish piracies and felonies committed on the high seas, and offences against the law of nations. In pursuance of the authority it was declared, by the act of Congress of April 30, 1790, c. 9, sect. 8, that murder or robbery committed on the high seas, or in any river, harbor, or bay, out of the jurisdiction of any particular State, or any other offence, which, if committed within the body of a county, would, by the laws of the U. States, be punishable with death, should be adjudged to be piracy or felony, and punishable with death. It was further declared that, if any captain or mariner should piratically or feloniously run away with any vessel, or any goods or merchandise to the value of $50, or should yield up any such vessel voluntarily to pirates; or if any seaman should forcibly endeavor to hinder his commander from defending the ship or goods committed to his trust, or should make a revolt in the ship, every such offender should be adjudged a pirate and felon, and be punishable with death. And by the act of May 15, 1820, c. 113, sect. 3, Congress declared that if any person upon the high seas, or in any open roadstead or bay or river, where the sea ebbs and flows, commits the crime of robbery, in or upon any vessel, or the lading thereof, or the crew, he shall be adjudged a pirate. So if any person, engaged in any piratical enterprise, or belonging to the crew of any piratical vessel, should land and commit robbery on shore, such an offender shall also be adjudged a pirate. An act of March 3, 1847, provides that subjects or citizens of foreign States found and taken on the seas making war on the U. States, or cruising against the vessels and property thereof, or of the citizens of the same, contrary to the provisions of any treaty existing between the U. States and the country of such persons, shall, when such acts are declared by such treaties to be piracy, be arraigned, tried, convicted, and punished in the courts of the U. States. Lastly, an act of Congress, of Aug. 5, 1861, makes vessels built, purchased, fitted out, or held for piratical acts subject to seizure and condemnation, whether any act of piracy has been committed or attempted from such vessel or not.

Liability of Insurers. There can be no piracy or robbery without violence: but this is not necessary to constitute the crime of theft. Piracy and robbery are most usually committed by strangers to the ship; they may, however, be committed by the crew; and the insurers are answerable for such a loss, unless it arise from the fault of the owner. If theft be committed by the crew, we should still hold the insurers liable. This may be doubtful; but insurers regard it as at least possible, and provide against it by the phrase, "assailing thieves." This excludes theft without violence, and perhaps all theft by those lawfully on board the vessel, as a part of the ship's company. If, after shipwreck, the property is stolen, the insurers are liable, and would probably be so if there were no insurance against theft, if this was a direct effect of the wrecking.

Piræus. See GREECE.

Pirameter, the name given to an instrument for ascertaining the power required to draw carriages over roads.

Pirate, a sea-robber; a vessel which attacks others at sea for the sake of plunder. See PIRACY.

Pirating, counterfeiting; copying anything without permission. See COPYRIGHT.

Pirl, to twist or twine, as in forming horse-hair into a fishing-line.

Pirogue, a rough canoe formed out of the trunk of a tree.

Pisciculture, the propagation of fish by the artificial incubation of the spawn.

Pisé, blocks of clay rammed into moulds; rammed earth, used in some countries to build the walls of cottages.

Pistachio [Fr. *pistache;* Ger. *Pistazie;* It. *pistacchio;* Sp. *pistacho*], the fruit of the *Pistachia vera*, a kind of turpentine-tree. It grows naturally in Arabia, Persia, and Syria; also in Sicily, whence the nuts are annually brought to us. They are oblong and pointed, about the size and shape of a filbert, including a kernel of a pale greenish color, covered with a yellowish or reddish skin. They have a pleasant, sweetish, unctuous taste, resembling that of sweet almonds; their principal difference from which consists in their having a greater degree of sweetness, accompanied with a light grateful flavor, and in being more oily. Pistachios imported from the East are superior to those raised in Europe. They are used as a dessert fruit, in confectionery, and also to make a sort of cosmetic-powder for the face.

Pistareen, a Spanish silver coin, worth about 20 cts.

Pistol, a well-known hand weapon; the smallest firearm used. See REVOLVER.

Pistole, a gold coin formerly current in several of the European States. The Spanish *P.* is the fourth of the doubloon.

Piston, the sucker, or part of a pump which fits the bore; the short cylinder or disk of a steam-engine, acted upon by the air or steam, and causing suction.

Piston-Rod, the rod by which a piston is forced down and drawn up.

Pit, a well, or deep hole; the sunken shaft of a mine. — The floor or chief audience part of a playhouse. — A place for sawing wood.

Pita, a name for aloe-fibre, obtained from the leaves of the *Agave Americana*, which is made into a strong and white cordage, and also manufactured into paper in Mexico.

Pitch, the residuum which remains after tar has distilled or boiled in an open pot, so as to drive off the volatile matter. It is one of the products of the pine-tree classed in commerce as naval stores. Mixed with some oil, so as to render it less brittle, it is largely used in shipbuilding to pay the seams and thus render it impervious to water. It is also used in medicine as a mild stimulant and tonic. See BURGUNDY TAR. The residue from the distillation of coal tar is also called pitch, and is used as a coloring ingredient of a coarse black varnish much used for protecting iron-work from rust.

Pitch, the point where a declivity begins, or the declivity itself; descent; slope; the degree of descent or declivity. — In wheel-work, the distance between the centres of two contiguous teeth. *Pitch-line* is the circle, concentric with the circumference, which passes through all the centres of the teeth. — In architecture, the inclination of the sloping sides of a roof to the horizon. It is usually designated by the ratio of its height to the space covered. — The rising or falling of a vessel in a heavy sea.

Pitch-back Wheel, a kind of wheel used in a mill; the water is turned at an angle with its direction in the flume before descending into the buckets.

Pitch-Blende, a valuable ore for the porcelain painter, etc., producing a fine orange color, and also a black, found in Saxony, Bohemia, etc.

Pitch Coal. See JET.

Pitcher, an earthen water-jug.

Pitchfork, a prong with which hay, etc., is lifted from a cart to the rick.

Pitching, a market term in England for unloading, and for the small charge paid to the carrier for looking after the empty packages and cloths, and returning them correctly. — Fixing a

tent or booth. — Covering a ship's bottom, a roof, or palings with pitch or tar.

Pitch-Ladle, an iron ladle for lifting out pitch from a boiler.

Pitch-Stone, a vitreous lava which occurs in veins and beds, and sometimes in whole mountains.

Pitch-Wheels, toothed wheels in machinery or clocks, which work together.

Pitch-Work, work done in a coal-mine by those working on tribute.

Pit-Coal, mineral coal, as distinguished from charcoal.

Pith, the cellular or spongy substance of plant stalks, used for various purposes, for making light models, etc. The pith of the elder is used for electrical purposes; that of the sago palm is converted into starch. See Shola.

Pitman, a collier; one who looks after the mine-gear; the sawyer who stands in the pit. — In machinery, the rod by which a rotary and a reciprocating object are connected, as the rod which connects a steam-piston with its crank-shaft.

Pit-Saw, a large saw used by two men, one of whom stands on the log and the other beneath it, sometimes in a pit.

Pittsburgh, a city of Pennsylvania, port of entry, and the capital of Alleghany County, second only to Philadelphia in population and manufacturing interests, is situated at the conflux of the Alleghany and Monongahela Rivers, where they form the Ohio, which is here a quarter of a mile wide. It is in lat. 40° 32′ N., lon. 80° 2′ W., 357 m. W. by N. by rail from Philadelphia, 247 m. W. N. W. of Harrisburg, 226 m. from Washington, and 2,044 m. above New Orleans by the course of the river. The community known to commerce by the name of *P.* consists of two cities, *P.* and Alleghany, which, with the exception of their municipal governments, form, in all respects, one city. These two cities and their suburbs are connected by 12 bridges, 7 of which span the Alleghany River, and 5 the Monongahela; the bridges between *P.* and Alleghany amounting practically to continuous streets, over which the street-railway cars run, as from ward to ward in cities not divided by rivers running through their settled area. *P.* is connected with the cities of the E., and almost all parts of the State, by the Pennsylvania, the Alleghany Valley, and the *P.*, Washington, and Baltimore R.Rs.; with the W. and N. W., by the *P.*, Fort Wayne, and Chicago R.R., and tributary lines; and with the S. W. by the *P.*, Cincinnati, and St. Louis R.R. Numerous steamboats are plying on the Ohio to Cincinnati and other ports, while the Alleghany and Monongahela afford natural facilities for the reception of iron and coal from the mines, mineral oil from the wells, and lumber from the forests. The population, which in 1788 was estimated at about 500, was 1,565 in 1800, 16,988 in 1830, 79,873 in 1850, 121,799 in 1870, and 150,000 in 1880 (or 225,000 if we include Alleghany City).

P. is pre-eminently the manufacturing city of America, and its two appellations of "Iron City" and "Smoky City" indicate its two leading branches of industry, — iron and coal, which abound in the surrounding country. The first iron foundry was erected at *P.* in 1804, at which, in 1812, were cast cannon for supplying the fleet on Lake Erie, and for the defence of New Orleans. The first rolling-mill was erected in 1812. There are now about 20 rolling-mills and 175 iron establishments, in which the product of these mills is manufactured into steam-machinery and every kind of iron implements. There are about 70 iron foundries; and the total consumption of pig-metal is equal to 600,000 tons annually, being about one fourth of all that is produced in the U. States. The annual value of iron manufactures is about $40,000,000. Steel was first attempted to be made at *P.* in 1828, and for several years only the lower grades were produced. In 1860 the manufacture of cast-steel for edge-tools was begun, and the best qualities of English steel are now rivalled by *P.* manufacture. In 1833 there was but one steel-converting furnace, producing 25 tons every three weeks, of a low grade of blister-steel. There are now 7 large steel-works, producing 25,000 tons annually of all grades of steel. There are also 5 copper-manufacturing establishments, the annual products of which are valued at $3,000,000. In 1879 there were about 140 collieries in operation in the vicinity of the city, from which over 140,000,000 bushels of coal are annually taken. The making of coke has also developed into a considerable industry, more than a million tons having been produced in 1879. *P.* is largely engaged in the petroleum trade, and has numerous refineries. The receipts of crude oil in 1879 amounted to 2,080.509 bbls., and 1,292,385 bbls. of refined oil was shipped E. and W. In 1796 the manufacture of glass was begun at *P.*, being the pioneer manufacturing establishment of all that have followed here and throughout the W. In 1879 the city had about 45 glass-factories, producing articles of the annual value of about $11,000,000. There are also several important cotton and woollen mills, white lead, tobacco manufactories, distilleries, breweries, etc. *P.* has 16 national banks, whose aggregate capital is $9,000,000; and there are besides 37 State and savings banks, and private bankers, having an aggregate capital of $4,657,547. *P.* is a port of delivery of the district of New Orleans. The number of vessels belonging to the port in 1880 was 690 (tonnage, 130,769); of which 178, of an aggregate tonnage of 40,476, were steamers, and 512 (tonnage, 90,292) barges. The number of vessels built during the same year was 96, having an aggregate tonnage of 17,461, of which 16 (tonnage, 5,967) were steamers, and 80 (tonnage, 11,494) were barges.

Pittsburgh and Connelsville R.R. runs from Pittsburgh, Pa., to Cumberland, Md., 151.50 m. This Co., whose office is at Pittsburgh, was chartered in 1853; and the road, completed in 1860, was leased in 1875 to the Baltimore and Ohio R.R. Co., the rental paid being interest on the bonded debt, an annual contribution to the sinking fund of £7,200 sterling, and $3,000 annually for company expenses. Cap. stock, $1,955,741; funded debt, $10,718,600; other debts, $3,945,687. Cost of construction and equipment, $12,489,368.

Pittsburgh and Lake Erie R.R. runs from Pittsburgh, Pa., to Youngstown, O., 70.5 m. This Co., whose office is in Pittsburgh, was chartered in 1875, and the road was opened in 1879. Cap. stock, $1,259,853; funded debt, $1,675,000; floating debt, $483,699.

Pittsburgh, Cincinnati, and St. Louis R.R. runs from Pittsburgh, Pa., to Columbus, O., 192.8 m.; branch, 8.1 m.; total length of line, 200.9 m. This Co., whose principal office is at Pittsburgh, was formed in 1868 by the consolidation of the Pittsburgh and Steubenville, the Holliday's Cove, and the Steubenville and Indian R.R. Cos. Cap. stock, $8,437,200; funded debt, $12,497,000. Cost of road and equipment, $19,942,294.

Pittsburgh, Fort Wayne, and Chicago R.R. runs from Pittsburgh, Pa., to Chicago, Ill., 468.39 m. This Co. was formed by the consolidation in 1856 of the Ohio and Pennsylvania, Ohio and Indiana, and Fort Wayne and Chicago R.R. Cos. The road was sold under foreclosure in 1861, and the Co., reorganized in 1862, has leased all its property to the Pennsylvania Co., which operates the road, and pays 7% on the capital stock and funded debt. Cap. stock (common), $19,714,285; (guaranteed special), $5,669,300; funded debt, $13,510,000. Cost of constructing and equipment, $38,743,395. The address of the Co. is at Pittsburgh.

Pittsburgh, Titusville, and Buffalo R.R. runs from Corry to Irvineton, Pa., 95 m., with branch from Union to Titusville, 25 m.; total, 120 m. The present Co., located at Philadelphia, was organized in 1876 as successors of Oil Creek and Alleghany River R.R. Co., which itself was a consolidation, in 1868, of the Oil Creek, the Warren and Franklin, and the Farmers' R.Rs. Cap. stock, $4,959,450; funded debt, $4,050,933.

Piuma, the name given to a mixed fabric of light texture, used for gentlemen's coats.
Placage [Fr.], veneering; inlaying.
Placer, a gold field; a position or locality in an auriferous country.
Plaid, an outer loose tartan wrapper, worn by the Highlanders in Scotland.
Plain, simple, without ornament or beauty.
Plainbacks, a term in the weaving trade for bombazettes.
Plait, Plat, Pleat, a fold or double in cloth, linen, etc.
Plan, a scheme; an outline drawing or design; a ground plan of a building; a horizontal section.
Planchet, in coining, a piece of metal intended for a coin, with a smooth flat surface, to be placed in the mill for receiving the die impression.
Planchette, a small plank or board.

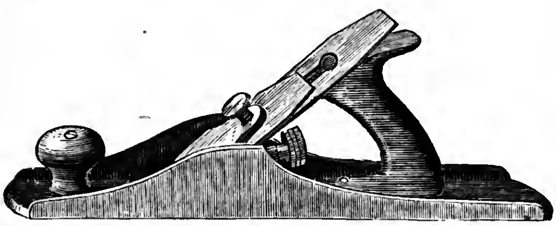

Fig. 399. — Metallic Jack-Plane, with Screw Adjustment.

Plane, a carpenter's cutting tool so fixed in a stock of wood or iron that the edge can only take off a thin shaving. In most instances the tool, or *plane-iron*, is fixed at a particular angle from the vertical, and a slit in the bottom of the block determines the thickness of the shaving that can be planed off. There are *grooving, moulding, surfacing, smoothing, rotating, jack, panel, trying, jointer*, and other kinds of planes. The inclination of the plane-iron is called the *pitch*, and varies from nearly vertical to 25° from the horizontal. For very hard and close-grained woods some of the planes act as scrapers rather than cutters. For special purposes the stock is of iron instead of wood (Fig. 399).

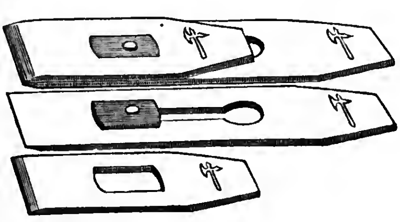

Fig. 400.

Plane-Irons, cutting irons to insert in a plane, and which are either double or single. In Fig. 400, 1. is the iron complete, 2. the bit with the cap removed, 3. the cap alone.
Planer, in printing, a flat square-made piece of wood, used by the compositor for forcing down the type in the form, and making the surface perfectly even.
Plane-Table, a surveyor's instrument for taking angles.
Planetarium, a machine for showing the motions of the planets.
Plane-Tree. See Button-Wood.
Planimeter, an instrument for calculating the area of plane figures.
Planing Machine, a machine-tool employed for the purpose of giving a perfectly plane face to iron, stone, or wood. Such engines consist, for the most part, of cutters moving horizontally, or with a rotary motion, fixed in a frame carried over the substance to be operated upon.
Planish, to smooth wood; to polish metals.
Planisher, a thin flat-ended tool used by turners for smoothing brass work.
Plank, a thick strong board, cut from various kinds of wood, especially oak and pine. Planks are usually of the thickness of from 1 inch to 4.
Planking, the covering of thick planks bolted longitudinally on the ribs and floor-timbers of a ship. A similar *P.* is fastened within. Each line of *P.* is denominated a *strake*, and is named from its quarter; as garboard-strake, bilge-strake, etc.
Plant, the tools, machinery, apparatus, or fixtures by which a mechanical business or manufacture is carried on, as a builder's plant, the plant of a brewery, a blacksmith's plant, etc., the engines and machinery, or rolling-stock of a railway.
Plantado-passado, the sun-dried fruit of the plantain, which forms a considerable article of internal commerce in some of the districts of Mexico.
Plantain, the name of two very different plants: I. The *Musa paradisiaca*, a variety of the banana, which it closely resembles, its fruit being, however, longer and more angled than that of the banana. It is largely cultivated in tropical countries. II. The *Plantago major* and other species of the same genus, a stemless herb, found almost everywhere around dwellings. Its dense, slender flower-spikes are often placed in the cages of birds, which are very fond of the unripe and ripe seeds; and the broad leaves have long had a popular reputation as a beneficial cooling application to bruises.

Fig. 401. — Common Plantain.

Plantation, a woodland of young trees.— An estate appropriated to the production of cotton, sugar, tobacco, etc., in the Southern States, the West Indies, etc.
Plant-Cane, a first crop of sugar-canes raised from cuttings, not a ratoon or second-shoot crop; the former yielding more juice and sugar.
Planter, the owner of a plantation.—A machine or agricultural implement, of which there are many kinds, for opening the ground for the reception of

the seed (corn, cotton-seed, etc.), dropping the seed, and lastly throwing back the earth.

Plashing, binding and interweaving branches of trees for low fences, etc.

Plasm, a mould or matrix.

Plasma, a transparent chalcedony of a grass-green or leek-green color, found in India and China.

Plaster, the name applied to cement manufactured from gypsum or sulphate of lime. When burnt at a low heat, this substance is not decomposed, like limestone, but merely parts with its water of solidification. It is then converted into a white powder, absorbing water greedily, and again solidifying. The powder produced is the common *Plaster of Paris*. Combined with alum during the process of calcination, *Keene's cement* is obtained. It dries more slowly thon common plaster, but is much harder, of a less opaque white, and is more durable. Reburnt with borax and other substances, still harder and finer cements are made. — An external application of a sticking nature, spread on cloth, leather, etc., and applied to a sore, a wound, etc.; as a *Court-Plaster*, which is made of silk, with some adhesive substance on one side.

Plasterer, a workman who covers the walls, ceilings, etc., of a house or other edifice with plaster.

Plaster-Image Maker, one who makes figures, medallions, and other casts in plaster of Paris.

Plastering, the application of a layer of plaster or mortar to the surface of brick or some other material. It is, in fact, a kind of veneering. Plastering also includes the making of plaster ornaments for the ceilings and cornices of rooms, etc. A plaster wall is to a wainscot wall of the old days what paper-hanging is to tapestry, a cheap substitute.

Plaster-of-Paris. See PLASTER.

Plata, the Spanish name for silver, applied to both ore and money.

Plastic, that is capable of being moulded, formed, or modelled; as plastic clay.

Plate, a flat or extended piece of metal.—A shallow, flattish dish or vessel from which provisions are eaten at table.— A general term applied to almost all horizontal timbers which are laid upon walls, etc., to receive other timber-work.— The impression on paper from an engraved copper or steel plate.— A page of stereotype, electrotype, or fixed metallic types, for printing from.—The denomination usually given to gold and silver wrought into articles of household furniture. This name is rather an inconsistent one for the costly articles to which it is applied. The trade of the goldsmith and silversmith combines the mechanical and the artistic in a remarkable degree. The former embraces almost all the processes known in metal manufactures — casting, rolling, stamping, wire-drawing, tube-making, chain-making, planishing, moulding, turning, drilling, filing, soldering, chasing, etc., with numerous finishing processes of a very delicate kind. See PLATING.

Plateau, a large ornamental centre dish for a table.— A tea tray or salver.

Plate-Basket, a basket lined with tin for removing plates which have been used from a dinner table; a small basket lined with baize for holding knives, forks, and spoons.

Plate-bending-Machine, a rolling machine for bending plates of metal to any required curve, for making iron boiler plates, water-wheel buckets, etc.

Plated-Ware [Fr. *doublé*], articles silvered over, or gilt.— Electrotyped articles. See PLATING.

Plate-Engraving. See COPPER-PLATE ENGRAVING.

Plate-Glass. See GLASS.

Platel, a small dish.

Plate-Layer, a workman who lays down the iron rails, and fixes them to the sleepers of a railway.

Plate-Leather, a kind of wash leather; chamois leather used for rubbing and cleaning silver or plated articles.

Plate-Powder, a powder for brightening plate, made of rouge and prepared chalk, or of putty-powder and rose-pink.

Plater, an electrotyper; one who coats metal articles with silver or gold.

Plate-Rack, a wooden frame fixed in a scullery to stand plates and dishes in to drain after they are washed.

Plates and Dishes, articles of crockeryware for table use, usually sold in sets; sometimes in a complete or full dinner service of so many pieces.

Plate-Warmer, a japanned metal or tin case with shelves, for standing plates in before a fire to warm.

Platform, a landing stage. — An elevation of earth, wood, or stone. — A hustings. — The raised part of a railway station.

Platillas, the name of a white linen fabric made in Silesia. It is 30 or 35 yards long, by 27 to 31 inches wide.

Platina, twisted silver wire; an iron plate for glazing stuff.

Plating, putting a watering of silk on a substratum or foundation of cotton. — The coating of one metal with another of superior quality. The superior metal may be gold or silver; the coating is not a mere wash, as in metal gilding or silvering, but a plate of solid metal. It is the next best material to solid standard gold or silver for costly articles of table-plate, etc., seeing that the thickness of the precious metal is greater than that which is deposited by the electro process.

One of the first modes of practising this art was by applying leaves of beaten silver to the finished surfaces of articles in brass and steel, and causing the silver to adhere by a careful application of heat. Leaves of gold were applied in a somewhat similar way. The mode of producing the best Sheffield silver-plated goods is now, however, as follows: Copper and brass are cast into an ingot 18 inches long, 3 broad, and $1\frac{1}{8}$ thick. If to be *double-plated*, both sides of the ingot are filed smooth, and a plate of silver laid on each; if to be *single-plated*, only one side is thus treated. The silver is very much thinner than the ingot. A saturated solution of borax is brushed in at the edges, and then the ingot is placed in a small oven heated with coke, where a temperature is maintained just sufficient to make the silver fuse down upon the copper, but without allowing the latter to penetrate through and discolor the former. The compound ingot thus made is cleaned, rolled between cylinders to the required thickness, annealed frequently between the successive rollings, steeped in hot dilute sulphuric acid, and finally scoured with fine sand. The sheets thus produced have a layer of silver proportionate to the thickness of silver originally applied to the ingot; they are silvered on one side only, if for articles of which only one surface is to be visible; but if otherwise, double-plated sheets are used. Ingots of solid silver can be plated with gold by a modification of the same kind of process. The sheets of metal thus prepared are wrought up into ornamental forms by various processes of stamping, swaging, chasing, *repoussé* work, etc., such as are described under the appropriate headings. Plated work of all kinds, however, is being very extensively supplanted by the more rapid and economical art of ELECTRO METALLURGY (which see).

Platinum, a metal of a color between steel-gray and silver-white, sp. gr. 21.5. It is very hard, and possesses great malleability and ductility. It may be beaten into fine leaves, and drawn into wire not exceeding 1-2000ths of an inch in diameter. When about 1-13th of an inch thick it sustains a weight of 270 lbs. This metal is extremely difficult of fusion; but it has the property of being united by *welding* either one piece to another, or with iron and steel. This property admits of

useful applications in the arts; wires may be joined so as to form rings and chains; and, with a view to economy, *P.* may be attached to iron or steel for many scientific purposes. The perfection with which vessels of *P.* resist the action of heat and air, of most of the acids, and of sulphur and mercury, renders them peculiarly valuable in many chemical applications; and notwithstanding the high value of the metal, which is worth between four and five times its weight of silver, it is much employed for crucibles, retorts for the distillation of sulphuric acid, mirrors for reflecting telescopes, and also by gunsmiths. Its properties in a minute state of subdivision are interesting. If the chloride of *P.* is dissolved in a strong solution of caustic potash, and alcohol added, carbonic acid escapes, and the metal becomes reduced into the form of a fine black powder known as *platinum-black*. In this finely divided state it greedily condenses oxygen from the air, absorbing many times its bulk of that gas. If moistened with ether or alcohol, it imparts this oxygen to them, forming new compounds, and glowing with the heat produced. — *P.* is found in the metallic state in Brazil and Peru; in Antioquia in South America; in Estremadura in Spain; and lately in considerable quantities in the Uralian Mountains. The general appearance of it in the rough state in which it is imported is that of small grains or scales, darker than silver, and extremely heavy. *Imp.* free.

Platrier, a French plasterer.

Platter, a large wooden plate or dish. — In Germany, one who irons linen.

Plattin, Platen, the flat superincumbent part of a printing-press, which, when brought down on the types, gives the impression.

Platting, slips of bast, cane, straw, etc., woven or plaited, for making hats, etc.

Play, a drama; a story told by actors.

Play-Bill, a printed guide to the amusements of the evening in a play-house or theatre.

Play-Book, a book containing the words of a play, as acted.

Playing Cards [Fr. *cartes à jouer;* Ger. *Karten, Spiel Karten;* It. *carte de giuoco;* Sp. *carras, naipes*], pieces of cardboard made in 4 suits of 13 each, with painted figures and devices on them, for playing games with. The four suits constitute a pack. There are, however, packs of 32 cards only, in which each suit consists of 8 cards.

The schedule of stamp duty on the manuf. of *P. C.* in the U. States is given under Medicinal Preparations. *Imp.* duty: *P. C.* costing not over 25 cents per pack, 25 cents per pack; costing over 25 cents per pack, 35 cents per pack.

Playwright, a dramatist; an adapter of plays.

Plea, an allegation. — A legal act or form of pleading.

Pleasure Boat, a small boat for use on a river or lake.

Pleasure Train, a railway excursion-train.

Pleat, to crimp linen or lace in narrow folds.

Pledge, an article put in pawn.

Plenshing-Nail, a large nail for fastening planks or floor boards to the joists.

Pleurisy Root, a name for the *Asclepias tuberosa*, which is expectorant, diaphoretic, and a mild tonic and stimulant.

Pliers, Plyers, small nippers or pincers to hold wire, etc., to bend it; of which there are several kinds made, for the use of bell-hangers, saddlers, and others; there are also fishing pliers, bottling pliers, etc.

Ploc, a mixture of hair and tar for covering a ship's bottom.

Plombier, a plumber and glazier in France.

Plot, a small piece of land. — The story of a play. — To lay out ground.

Plotting Scale, a mathematical instrument used in plotting ground, which is a foot or a foot and a half long, and an inch and a half broad.

Plough, a carpenter's kind of plane which cuts a groove instead of a plain surface. — A bookbinder's knife or press for cutting paper. See Bookbinding. — The more important application of this name is to the well-known farming implement for turning up the soil, of which there are several kinds, adapted either for light or heavy land, as swing, wheel, or turn-wrist *P.*, draining or subsoil *P.*, etc.

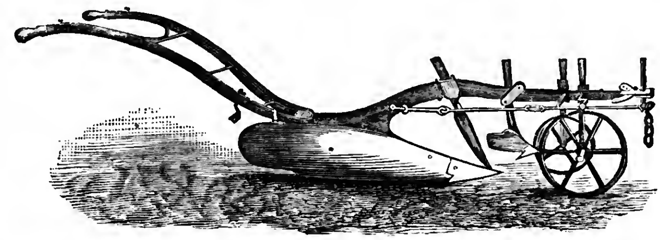

Fig. 402. — Hornsby's Champion Plough.

The different parts of a *P.* are now usually cast; so that if any one fails or wears out it can easily be replaced by removing a few screws or bolts. In modern *P.* the handles should be sufficiently wide apart to permit the ploughman to walk in the furrow, and long enough to give him a full command of the *P.*, so that he can lift or depress it readily, or turn it to the left or right hand at pleasure. The beam should be of such a length that its end, usually called its *head*, shall cut at the point of draught upon a line drawn from that part of the collar to which the traces are fastened to that part of it where it first raises the soil. Much of the steady working of the *P.* at its proper depth depends on the right arrangement of the point of draught. The beam should be curved upwards at the coulter and throat of the *P.* to clean itself of rubbish. The *ploughshare* is the apex of the sole, as the hind part is called the heel. It varies in shape for different purposes. The upper part over the box of the share forms the first part of the rise of the mould-board. After the coulter and share have made the vertical and horizontal cuts for the depth and width of the furrow, the mould-board turns over the slice and leaves it in its proper position. Much, if not all the beauty of ploughing, depends on the precision with which this part of the *P.* does its work. The *coulter* is an iron blade or knife inserted into the beam of the *P.* for the purpose of cutting the ground and facilitating the separation of the furrow-slice by the ploughshare. As an example of the modern *P.*, with all its latest improvements, the American *P.* being generally known, we give (Fig. 402) Hornsby's champion model, an English prize *P.*, which has a small precedent share to turn over the stubble, a coulter, and a share with a wing; the share gradually merges into a long, peculiarly shaped mould-board, which is convex and then concave, — a form not common in America. Of the pair of wheels, one runs in a furrow, the other on the land. The stilts are long, and great command over the *P.* is obtained by the leverage. The jointed draft-rod passes through an eye-bolt dependent from the nose of the beam, thence to the carriage of the wheels, and is bolted to the sheath of the *P.* at a point above the mid-length of the mould-board. — The application of steam-power to the draught of *P.*, of little use in this country, is especially well suited to the highly cultivated soil of England. The ploughing machine is, in this case, a frame-work containing three or more *P.* acting nearly abreast, but in succession to one another, so that a number of furrow-slices are turned at once. The whole weight of the machine is carried on large wheels, and there is no pressure on the sole-plate, and none of that consequent hardening of a sub-soil floor upon which, in ordinary ploughing, the furrow-slices lie. This tends to improve the drainage, tilth, and fertility of the soil. *Imp.* duty: iron *P.*, 35 per cent.

Ploughman, a laborer who holds the handles and guides the plough.

Ploughshare. See PLOUGH.

Plout-Net, POUT-NET, a small river fishing-net shaped like a stocking, attached to two poles.

Plucker, a machine used in a worsted factory, consisting of a pair of spiked rollers fed by an endless apron, for cleansing and straightening the fibres of wool.

Plug, a peg of wood. — A metal bung. — A water tap, or any substance that serves to stop a hole or breach. — A stopple for the hole in the bottom of a boat, by which water may be let out. — The branch pipe of a hydrant leading from the main below the pavement and terminating at a point readily reached for the attachment of hose. See FIRE-HYDRANT.

Plugger, a dentist's instrument of various forms, for driving and packing a filling material into an excavated hole in a carious tooth.

Plug Rod, an air-pump rod.

Plug Tobacco, the trade name for spun and twisted chewing tobacco made up in small rolls, each roll being called a plug; also for cakes of cavendish and other chewing tobacco.

Fig. 403. — PLUM-TREE.

Plum [Fr. *prune;* Ger. *Pflama;* It. *prugna, susina;* Port. *ameixa;* Sp. *cirnela*], the fruit of trees of the genus *Prunus,* too well known to require any description. There are said to be nearly 300 varieties of plums. The *Prunus domesticus* (Fig. 403) and many of its varieties are cultivated for ornament, or their fruit, in all the temperate countries of the habitable globe. The introduction of this tree into the U. States dates back to the earliest period of their settlement. Its wood is hard, close, compact, beautifully veined, and susceptible of a fine polish. When dry, it weighs from forty to fifty pounds to a cubic foot, according to the age and growth of the tree. Its texture is silky, and when washed with lime-water its color is heightened, and may be preserved by the application of varnish or wax. Unfortunately for this tree, its wood is sometimes rotten at the heart. In France and Germany it is much sought after by turners, cabinet-makers, and the manufacturers of musical instruments. The use of the fruit in domestic economy for dessert, and for making tarts and puddings, is well known. In France the green-gage, the best of all plums, is almost the only variety that is eaten fresh; other plums are principally used dry or preserved, and enter extensively into commerce. The kinds usually employed for preserving are the Brignole, the prune d'Ast, the Perdrigon blanc, the prune d'Agen, and the Ste. Catherine. In warm countries plums or prunes are dried on hurdles by solar heat; but in cold climates, artificial heat is employed; the fruit being exposed to the heat of an oven and to that of the sun on alternate days. Table prunes are prepared from the larger kinds of plums, as the green-gage, and Ste. Catherine; those employed in medicine from the Ste. Julienne. The former have a very sweet and agreeable taste, and the latter are somewhat austere. Of our native plums, the best is the Chickasaw; its globular fruit is red and almost without bloom, the skin is thin and the flavor pleasant. Much attention has been paid of late to improving its varieties owing to the difficulty of successfully cultivating the varieties of the European plum, on account of the attacks of the curculio. Fresh, ripe plums, taken in moderate quantities, are regarded as nutritive and wholesome; but in large quantities they readily disorder the bowels; and when immature, they still more easily excite ill effects. The medicinal prunes are employed as an agreeable, mild laxative for children, and are given during convalescence from febrile and inflammatory disorders in adults.

Plumbago, GRAPHITE, BLACK-LEAD, a mineral consisting of pure carbon, with a variable quantity of iron up to a proportion of 5 per cent. Graphite is the name now most generally given to it; and its common names of black-lead and plumbago are inappropriate, there being no lead in its composition. It is infusible, very difficult of combustion, and when mixed with fire-clay is used for the manufacture of crucibles intended to withstand a high degree of heat. It undergoes no change in the air, and is used to cover articles of iron to prevent rust, and also for lubricating machinery. It is used also for the manufacture of pencils, either pure or ground up and mixed with clay. When graphite is burned in oxygen, it leaves a residue of yellow ash composed chiefly of oxide of iron. It is an abundant mineral, occurring at many places in this country. At Sturbridge, Mass., especially, it is found in large masses and extensively worked. The mines of Borrowdale, in Cumberland, England, which furnish the best quality of graphite, are almost exhausted. *Imp.* free.

Plumber, one who works in lead.

Plumber Block, PLUMBER BOX, a metal box or case containing the pillars on which the journals of shafts, etc., revolve.

Plumb-Line, a line with a plummet attached to ascertain whether any work is perpendicular.

Plumb-Rule, a narrow board with a plumb-line.

Plume [Fr. *plumet*], an ornament or bunch of feathers for the head, or for decorating a hearse.

Plummet, a pencil of solid lead. — A lump of lead for sounding, or for the line of a plumb-rule.

Plunger, the piston of a forcing-pump.

Plunket, a light-blue color.

Plush, a kind of unshorn velvet. See VELVET. Sometimes the yarns employed in weaving it are worsted and goats' hair, sometimes silk and cotton, sometimes silk only. There is always a double warp to it, one warp being brought up to the surface to produce the shaggy or plush effect. In the plush now used to so enormous an extent for covering men's hats, the cotton is hidden behind, and only the silk shown at the surface.

Pluviometer, an instrument to measure the quantity of rain that falls. See RAIN-GAUGE.

Ply, a fold, twist, or plait. — To work between two points, as a ferry-boat, a stage, etc.

Plyers, a kind of nippers. — The balance for a drawbridge. — See PLIERS.

Plymouth. See GREAT BRITAIN (SEAPORTS).

Pneumatics, that branch of physical science which treats of the mechanical properties of elastic fluids, and principally of atmospheric air.

Poach, to steal game. — To soften or boil by cookery. — To stab or spear.

Poak, the collected waste from the preparation of skins, such as the refuse hair, oil, lime, etc., chiefly sold for manure.

Pocket, a pouch or small bag in a garment. — A mass of rich ore. — A large bag for holding ginger, cowry shells, hops, etc. In the wool and hop trade, a pocket contains half a sack, or 12 stone of 14 lbs. each; but it is a variable quantity, the articles being sold by their actual weight.

Pocket-Book, a small, leather-covered book, used for carrying notes, papers, etc., in the pocket.

Pocket-Glass, a small compact telescope to be carried in the pocket; a magnifying-glass; a small dram-glass in a case.

Pocket-Handkerchief, a handkerchief of linen, silk, or cotton, carried in the pocket for use. Some of the dress *P.-H.* for ladies, of thin muslin or cambric, are highly embroidered and ornamented, and more for show than use.

Pocket-Knife, a knife with blades folding into the handle, so as to be carried in the pocket.

Pocket Ledger, a small private abstract ledger, with a lock or clasp, kept by bankers, merchants, and others, for their own reference.

Pod, the capsule or seed-case of legumes.

Podder, a miner's name for copper ore.

Pohegan, a name for a kind of paste-bait for mackerel, etc., made of damaged and frequently putrid fish, chopped or ground in a cutting-mill.

Poids (Fr.), weight.

Poil de Chevre. See MOHAIR.

Point, the sharp end of a tool or instrument. — A degree of the horizon or mariners' compass. — A railway switch. — To insert lime with a small trowel between the stones of a wall already built. — To aim a gun. — To twist and bind the end of a rope, and protect it from ravelling.

Pointer, the index hand of a watch or clock. — A setter, a kind of sporting dog. — A graving-tool.

Point-Lace, a very fine kind of pillow lace of flax made with the needle. The term is also sometimes applied to certain kinds of bobbin lace. See LACE.

Poire [Fr.], a pear.

Pois [Fr.], pease.

Poisons, many vegetable and mineral substances dangerous to life, some of which, however, in the hands of skilled practitioners are used as powerful remedies in disease.

Poivre [Fr.], pepper.

Poix [Fr.], pitch.

Pokel Fleisch [Ger.], pickled or salted meat.

Poker, a long iron bar used in mast-making to drive on the hoop. — A polished metal bar for stirring the fire in a grate.

Polacca, POLACRE, a lateen-rigged vessel, common to the Mediterranean.

Polar Circle, two small circles on a globe, 23° 28′ from the poles and parallel with the equator. — The arctic or North, and the antarctic or South, polar circle.

Polariscope, an instrument for showing the polarization of light.

Poldavy, a coarse kind of canvas.

Pole, one of the extremities of the earth's axis, North or South. — One of the two points in a magnet, battery, etc., in which polar force is manifested, and which convey *positive* or *negative* electricity (so called) respectively. — A prop. — The tall stock of a tree planted in the ground. — A rod, a perch, a measure of length of 5½ yards; also a square measure of 30¼ sq. yards.

Pole-Axe, a boarding axe used on shipboard; also by slaughter-men.

Polemit, a sort of French camlet.

Policy, the certificate issued to an insurer by an insurance office. See INSURANCE (FIRE), LIFE INSURANCE, MARINE INSURANCE.

Policy-Book, a book kept by an insurance Co. for making entries of policies granted.

Policy-Holders, the persons insured in a company.

Polishing, the art of giving brightness to any substance, as wood, metal, glass, etc.

One among the many varieties of polishing is the *lapping* or *glazing* of cutlery and other steel goods. It is done on revolving wheels called *laps*, mostly made of wood with metal rims, touched with emery and oil. The metal is a soft alloy, such as lead with about one fifth its weight of tin. Some of the wheels, called *glazers*, are wholly of wood — mahogany, walnut, oak, or birch — touched on the rims with dry emery. The size of the wheel is made to depend on the kind of article to be polished, especially razors; and according as a coarse lap and heavy pressure, or a fine lap and light pressure, are applied, so does the steel assume a whitish or a blackish polish, each suitable for some particular purposes. For razors and fine cutlery, leather wheels touched with dry crocus powder are used. Lapping on metal wheels, glazing on wheels of wood, and polishing on leather wheels, are sometimes required in succession for the same article, or two out of the three. The polishing of stone, marble, wood, and other substances is treated under the proper headings.

Polishing-Brush, a hand brush for shining stoves or grates, shoes and furniture.

Polishing-Iron, a smoothing iron; a bookbinder's tool.

Polishing-Paste, a kind of blacking or paste for harness and leather; a substance compounded of oil, beeswax, and spirit varnish, for giving a polish to articles of household furniture.

Polishing-Slates, a name for hone-slates or whetstones.

Polishing-Snake, a tool used by lithographers.

Polish-Powder, a preparation of graphite for stoves and iron articles; rouge or other substances for brightening articles of plate. See PLATE-POWDER

Polka-Jacket, a hand-knitted worsted jacket.

Pollack, the *Merlangus purpureus*, a fish which is caught abundantly on the New England coast in spring and autumn. It is caught, salted, and sold in the same manner as the cod, which it much resembles.

Pollard, a coarse product of wheat from the mill, but finer than bran.— Also a lopped or polled tree. See SHARPS.

Pollen, a fresh-water herring.

Polling, a process by which copper is changed from a highly crystalline mass into a metal which may be beaten into thin leaves.

Polpoltin, a Russian coin of two denominations, one equal to 23 copecks, worth about 21 cents; the other of 5 grives or 50 copecks.

Poltin, the half of a Russian rouble.

Polverine, glass-makers' ashes.

Polychord, having many strings; an apparatus which couples two octave notes, and can be affixed to any pianoforte or similar instrument with keys.

Polychrome Printing. See Color Printing.

Polyglot, a book in several languages.

Polygraph, a copying machine.

Polyscope, a multiplying glass or lens.

Pomade, Pomatum, a scented ointment for the hair. *Imp.* duty, 50 per cent.

Pomard. See Burgundy Wines.

Pomegranate [Fr. *grenade;* Ger. *Granatapfel;* It. *mela grana;* Port. *romãa;* Sp. *granada*], a small evergreen shrub (Fig. 404), resembling a myrtle, with numerous slender spinose branches; leaves opposite, entire, lanceolate, bright green, and sessile; flowers large, terminal, and rich crimson in color. The fruit is about the size of a large poppy head, and similarly shaped; its rind hard, leathery, and beautifully colored; when ripe, golden yellow, with a rosy tinge. When the rind is broken, the interior of the fruit is found to be filled with numerous seeds, each enveloped in a rose-colored

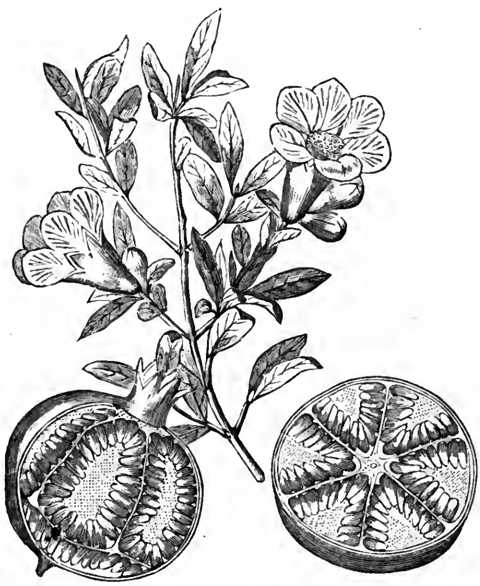

Fig. 404. — Pomegranate.

pulp, packed together in two rows, with partitions of pith between them, and closely resembling red currants. There is scarcely a part of the *P.* that is not either useful or agreeable. The bark of the root has been long known as a vermifuge. The pulp of the fruit is refreshing to persons suffering from fever. The seeds and flowers dried form a valuable medicine, and are used in dyeing, and the rind, on account of its astringency, is employed in tanning and preparing the finer kinds of leather, as the morocco, so much used for binding books. The *P.* is a native of northern Africa, Syria, and Persia, but it is now naturalized in the warmer parts of Europe, the West Indies, and our Southern States, the neighborhood of Augusta, Ga., being particularly celebrated for the excellence of its fruit.

Pomerange [Ger.], the orange.

Pomme [Fr.], an apple.

Pommel, the knob on the hilt of a sword.—The protuberant part of a saddle bow. — A block of hard wood, flat above, rounded and grooved below, also called a cripple, and used by curriers in pressing and working skins to render them supple.

Pompet, a printer's inking-ball.

Pompion, a name for the common gourd, *Cucurbita pepo.*

Ponceau [Fr.], a deep scarlet.

Poncho, a Mexican woollen cape, cloak, or outer garment, without sleeves, which is merely a length of cloth with a slit made in it, for the head of the wearer to pass through, thus leaving the arms at liberty. Poncho is also a trade name for camlets, or stout worsted.

Poncire, a large, thick-rinded lemon.

Pondicherry, a town on the Coromandel coast, capital of the French possessions in India, in lat. 11° 57′ N., 85 m. S. by W. of Madras, at the mouth of a small river accessible to vessels of light draught. The annual value of the imports is about $800,-000, and of the exports about $2,500,000. Pop. 53,-500. The annexed territory has an area of 112 sq.m., and a total pop. of 136,715. There is no safe harbor, and vessels have to anchor on the open coast. The French possessions in India comprise also Chandermagore, Carnical, Mahé, and Yanaon; total area, 509 sq. m.; total pop. 227,063.

Poniard, a dagger.

Pont [Fr.], a bridge; also the deck of a ship.

Pontil, a glassblower's iron rod; also called a punto.

Ponton. See Pontoon.

Pontoon, a lighter for careening ships.— A flat-bottomed boat, covered and lined with tin or copper, used for forming bridges over rivers, for armies to cross.

Pony, a small horse; in betting on English horse races, the sum of £25.

Pony-Chaise, a small four-wheel carriage, to be drawn by a pony.

Pood, a Russian ordinary commercial weight, of which 63 make a ton. A pood contains 40 Russian pounds, and is ordinarily reckoned equal to 36 pounds avoirdupois; but is 36 lbs. 1 oz. 11 drs.

Pool-Balls, ivory balls, 9 or 12 to the set, about 2 inches in diameter, for playing a kind of billiards.

Pooler, an instrument used in a tan-yard for stirring up the vats.

Poonay-Oil, Poonseed-Oil, a bitter lamp-oil, obtained from the seeds of the *Calophyllum inophyllum*, which yield about 60 per cent of their weight of oil. It is also called Pinnacottay-oil.

Poop, a high partial deck, close aft in a ship.

Pop, the name of some varieties of maize in the U. States, as red, blue, white, yellow, and mixed pop.— Parched corn.— A vulgar name for pawning.

Pope. See Bishop.

Poplar [Fr. *peuplier;* Ger. *Pappel, Pappelbaum;* It. *pioppa;* Sp. *alamo*], a tree of the genus *Populus*, of which about 15 species are described. In most favorable situations the white *P.* grows with great rapidity, sometimes sending forth shoots 16 feet long in a single season. The wood is soft and not very durable, unless kept dry; but it is light, not apt either to swell or shrink, and easily wrought. The Lombardy *P.* grows rapidly, and shoots in a complete spire to a great height: its timber does not differ materially from that of the white *P.* It is very light, and is therefore well adapted for the manufacture of packing-cases. None of the species is fit for large timbers. The best known and most widely distributed of American species, is the Cottonwood, *Populus Canadensis* or *monilifera*, which grows 80 feet or more high. Its wood, though of very poor quality, is made to serve a variety of purposes in localities where this is the only large wood procurable.

Poplin was originally a French manufacture in silk; but the Irish poplins of the present day are a mixture of silk warp with worsted weft; in commoner kinds the silk is partially superseded by cotton or flax. There are many varieties, as watered, figured, brocaded, tissued, etc. The article known as Norwich poplin is made of silk and flax. *Imp.* duty: see SILK and WOOLLENS.

Poppy, the common name of herbs comprising the genus *Papaver*. The common *P.*, *Papaver sanniferum*, a variety of S. Europe, is the species which affords opium (see OPIUM), and is also the stock of most of our garden varieties. Its capsules, known in commerce as *P.-heads*, are much used in Europe for making a fomentation for painful affections, but their efficacy depends entirely on the very variable quantity of morphia they contain; and all preparations from *P.*-heads are advantageously replaced in this country by similar preparations from opium or morphia. The *P.* is largely cultivated in Northern France, Belgium, and Germany, for its seed, from which is obtained a bland drying oil, extensively used both in lamps and for food, also for adulterating olive or salad oil. *P.-seed oil* is of a light yellow color, remains a long time without becoming rancid, and is not easily affected by cold. *Imp.* duty: heads, free; seeds, ½ cent per lb.; seed oil, free.

Porcelain, as a kind of translucent or semitransparent ware, was not so early in vogue as the commoner kinds of opaque pottery, the materials required being more choice, and the baking process needing more care. The Chinese were acquainted with the making of it, however, in the seventh century, if not earlier; and it is from them that we obtain the designation of *China* or *Chinaware*.

The best *P.* is made in the Kiang-se province, at the celebrated furnaces, more than 500 in number, of Kin-he-chin, east of the Payang Lake. The produce is transported to Nang-chang-foo for sale, by canal. Commoner porcelain for foreign trade is made at Chaon-king-foo, west of Canton. The kaolin clay employed, consists of silica with alumina, together with a trace of iron and a little potash or soda. It is derived from the oxidized felspar of granite. The glaze is formed of white quartz, finely pounded, and rendered fusible by admixture with an alkali contained in the ashes of ferns. In Europe, the experiments to discover the secret of its manufacture were first made in Saxony, by Böttger, early in the present century; and by using a peculiar white earth found at Schneeberg, he eventually succeeded. The Saxony government, finding that Böttger could make white *P.*, bearing some considerable resemblauce to that of China, established a factory for him at Meissen, near Dresden, in 1810, where the manufacture was established under a very rigid system of secrecy; Bavaria followed the example at Munich, and France at Paris. By mixing nitre, sea-salt, chalk, marl, alum, soda, gypsum, and sand, the French produced what they called *tendre P.*, fusible at a low temperature, coated with a soft glaze, and highly susceptible of ornament; and their *Sèvres P.* has ever since been held in high repute. In Englaud, successive advancements were made at Chelsea, Derby, Plymouth, and Worcester, in the manufacture of *P.*; and the Wedgwoods, the Copelands, and the Mintons gradually introduced it in Staffordshire, where it has now firmly taken root. A peculiar kind of stony earth called *Cornish stone*, was, just about a century ago, found to be almost identical with the *kaolin*, or *P.* earth, employed by the Chinese; and this was a great step towards the naturalization of the manufacture in England. Most of the processes in the *P.* manufacture are similar to those employed for the production of earthenware and the better kinds of stoneware. For these processes, see POTTERY. See also ENAMEL, PARIAN, etc. For *Iron-stone China*, see WEDGWOOD WARE. *Imp.* duty: China, porcelain, and parian ware, gilded, ornamented, or decorated, 50 per cent; the same, plain white, 45 per cent.

Porcelain Paper, a kind of highly glazed French-made fancy paper, which is sometimes figured, painted, and gilt.

Porcupine Quills, the quills of the porcupine, *Hystrix cristata*, a rodent animal found throughout S. Europe, — allied generics found existing in N. America. They are used for making work-piercers or eyeletteers for ladies, penholders, tooth-picks, fish-floats, fancy work-boxes, etc. They are chiefly obtained from the European species, which is not common; therefore they are expensive.

Porcupine Wood, a species of palm, *Cocos nucifera*, so named because, when cut horizontally, the markings of the wood assimilate to the quills of the porcupine.

Fig. 405. — PORCUPINE.

Pork, the flesh of the hog sold fresh or salted. See HOG.

By the laws of the State of New York, "There shall be three qualities of pork that may be branded on inspection. The first is denominated *mess pork*, and shall consist of the sides of good fat hogs, exclusive of all other pieces, and each barrel containing it shall be branded on one of its heads 'mess pork.' The second quality shall be denominated *prime pork*, of which there shall not be in a barrel more than three shoulders, the legs being cut off at the knee joint, nor more than 24 lbs. of heads, which shall have the ears and snouts cut off, and the brains and bloody gristle taken out of the heads, and the rest of the pork to constitute a barrel of prime shall be made up of side pieces, neck and tail pieces, and the barrel of such pork shall be branded 'prime pork.' The third quality shall be denominated *cargo pork*, of which there shall not be in a barrel more than 30 lbs of head and four shoulders, and it shall be otherwise merchantable pork, and branded 'cargo pork.' The barrels shall be made of good seasoned white ash staves and heading, and each barrel shall contain 200 lbs. of pork." *Imp.* duty, 1 cent per lb.

Porker, a young pig under a year old.

Pork-Sausage, minced pork, seasoned and cased in gut.

Porphyry, an excessively hard stone of a reddish color, having a basis of felspar or clay, etc., with other mineral crystals dispersed through it. It is occasionally used for pilasters, plinths, slabs,

mullers, pestle mortars, etc.; but the labor of working it prevents it from coming much into use. Sometimes, however, the specimens of workmanship produced are highly beautiful and valuable.

Porpoise [Fr. *marsouin;* Ger. *Meerschwein*], a cetaceous animal, the American variety of which, *Phocœna Americana,* which much resembles the *P. communis* of Europe, is from 4 to 6 feet long, and very common on our coast. The leather made from porpoise skins is said to be the strongest known. Their skins are dressed for traces, and the Canadian mail-bags are made of them. These bags are very white, thick, and soft; they stand much chafing, and effectually resist the wet. The blubber yields about 6 gallons of oil of fine quality.

Porringer, a small metal vessel in which children eat porridge or milk.

Port, a harbor, river, or haven, formed either by nature or art, to receive and shelter shipping from the storms and waves of the open sea. Artificial ports are those which are either formed by throwing a strong mound or rampart across the harbor's mouth to some island or rock, or erecting two long barriers, which stretch from the land on each side like arms, or the horns of a crescent, and nearly enclose the haven. The former of these are called *mole-heads*, and the latter *piers.* — *Port of delivery*, a place designated by law where vessels may discharge their cargoes, having previously made entry at a port of entry. — *Port of entry*, a port at which any vessel, or the cargo on board, arriving from a foreign port or place within the United States, may make entry, and unlade the said cargo, or any part thereof, every port of entry being also by law declared a port of delivery.

Port is also a name given on some occasions to the larboard or left side of the ship, as in the following instances. Thus, it is said, "The ship heels to port;" that is, stoops or inclines to the larboard side. "Top the yard to port," the order to make the larboard extremity of a yard higher than the other. "Port the helm," the order to put the helm over the larboard side of the vessel. In all these senses this phrase appears intended to prevent any mistakes happening from the similarity of sounds in the words *starboard*, and *larboard*, particularly when they relate to the helm, where a misapprehension might be attended with very dangerous consequences.

Port. See PORTUGAL (WINES OF).

Portable, handy, that may be carried with ease; in French, the word implies anything wearable.

Portage, sailors' wages in port; also the amount of a sailor's wages for a voyage. — An interruption to river navigation; a carrying place round rapids and waterfalls, or from one water communication to another.

Portal, a small gate.

Port-au-Prince. See HAYTI.

Port-aux-Cayes. See HAYTI.

Port-Crayon, a lithographer's writing pencil; a pencil-case.

Port-Dues, certain tolls levied on shipping, entering or quitting a port.

Porte-Aiguille [Fr.], a needle-case; a surgeon's needle-bearer.

Porte-Allumettes [Fr.], a match-box.

Porte-Balle [Fr.], a pedlar.

Portefeuille [Fr.], PORTFOLIO, a pocket-book; a case for holding loose papers, drawings, etc.

Porte-Lettre [Fr.], a letter-case.

Porte-Monnaie [Fr.], a kind of leather purse, or fancy money-holder, for the pocket.

Porter, one who carries or conveys burdens for hire; a carrier. — A fermented malt liquor. See BEER.

Porterage, the hire of porters.

Porteur [Fr.], a carrier; a postilion's horse.

Portfire, an inflammable composition rolled in papers for discharging guns, instead of by a match.

Portico, a porch, hall, or gateway; a sheltered walk; any disposition or series of columns, which forms a sort of gallery.

Portland. See MAINE and OREGON.

Portland and Ogdensburg R.R. (*Portland division*) runs from Portland, Me., to Connecticut River, 94 m. This Co., whose offices are in Portland, was chartered in 1867, and the road was opened in 1875. Capital stock, $1,052,185; funded debt, $2,642,500. Cost of construction and equipment, $3,857,362.

Portland and Ogdensburg R.R. (*Vermont division*) runs from Lunenburg to Swanton, Vt., 119.25 m. This road belongs to three separate lines, the Lamoille Valley, the Montpelier and St. Johnsbury, and the Essex County R.Rs., which, in 1875, made an issue of consolidated bonds covering the whole line, the road being operated by an executive committee as if it belonged to a single corporation. The road was completed in 1877, and placed in the same year in the hands of a receiver. Cap. stock, $1,200,000; funded debt, 1st mortgage (on the 3 roads) 6 %, $2,300,000. Principal office, at St. Johnsbury, Vt.

Portland and Rochester R.R. runs from Portland, Me., to Rochester, N. H., 52.5 m. The road was opened in 1871, and the property of the Co. was placed in the hands of a receiver in 1877. Capital stock, $636,011; funded debt, $1,500,000. Principal office, at Portland, Me.

Portland Cement. See CEMENT.

Portland, Saco, and Portsmouth R.R. runs from Portland, Me., to Portsmouth, N. H., 51 m. This Co., located in Boston, Mass., was chartered in 1837, and the road, opened in 1842, is now rented to the Eastern R.R. Co., for a rental of 8 per cent on the stock until July 1, 1881, and after that date, 6 per cent. Capital stock, $1,500,000. Cost of road and equipment, $1,430,645.

Port-Louis. See MAURITIUS.

Porto Rico, an island of the West Indies, the fourth in point of size of the Greater Antilles, belonging to Spain. It lies about 60 m. E. of Cape Engano, Hayti, between lat. 17° 56′ and 18° 30′ N., and lon. 65° 30′ and 67° W., being 90 m. in length from E. to W., with a nearly uniform breadth of 36 m. Area, 3,550 sq. m.; capital, San Juan de Puerto Rico; pop. 646,362. The surface is much diversified, a range of mountains traversing the centre of the island from E. to W., averaging 1,500 feet high, and culminating in a peak 3,678 feet high. Extensive savannahs succeed the mountainous region, and are bordered by large and fertile tracts, which, besides the usual tropical vegetation, produce large quantities of sugar-cane. Sugar, ginger, hides, rum, molasses, coffee, cotton, tobacco of excellent quality, dye-woods, lignum-vitæ, etc., are the principal articles of export. The total annual value of the commerce is about $35,000,000, consisting in about equal parts of imports and exports.

The commercial intercourse with the U. States is important. For the year 1879, the value of *exports* to this country was $4,384,954, consisting chiefly of coffee, $19,701; india rubber, $14,326; fruits, $18,679; perfumery, $12,465; brown sugar (84,704,473 lbs.), $3,120,960; and molasses (5,052,010 gals.), $1,159,869. The value of *imports* from the U. States was $1,771,483, including beer in butts, $5,782; bread and biscuit, $35,101; Indian corn meal, $9,845; Maizena, $7,083; candles and tallow, $55,601; carriages, $9,794; cotton goods, $27,388; fancy goods, $8.339; glass and glassware, $25,709; machinery, etc., $127,826; edge tools, $9.309; firearms, $12,311; railroad bars, $16,870; manures, $34,141; mineral oil, $32,667; paper, $39,233; perfumery, $6,343; plated ware, $5,329; bacon and hams, $78,429; butter, $21,870; cheese,

$23,678; dried fish, $6,374; cured fish, $8,349; lard, $161,314; preserved meats, $13,870; pork, $133,634; onions, $5,660; potatoes, $9,881; sewing machines, $6,863; molasses, $20,676; tobacco, $18,761; lumber, $368,820; household furniture, $20,127. — During the year 1879, 171 American vessels (tonnage, 32,949), and 190 foreign (tonnage, 46,787), from Porto Rico, entered the ports of the U. States; and 143 American vessels (tonnage, 27,894), and 69 foreign (tonnage, 12,713) cleared our ports for the ports of the Spanish islands. — The four principal ports of *P. R.* are: —

Arecibo is situated in the Rio Arecibo, near the sea, 45 m. W. of San Juan. It is so totally unprotected that vessels are compelled to anchor in a very wide berth, and frequently, during the prevalence of N. winds, are forced to retire from the shore and put out to sea. They sometimes receive cargoes under sail, without casting anchor. Accidents are, in consequence, so frequent, that seldom does a year pass without having to record the loss of one or more vessels. The exports consist of sugar, molasses, coffee, timber for Spain, to be used in the Spanish ship-yards, and considerable quantities of tobacco for Cuba, the U. States, and Germany. Pop. 11,382.

Mayaguez, or MAYAGUAS, the most important port on the island, 70 m. S. W. of San Juan. The coffee of Mayaguez stands in such high repute in America and Germany, that purchases are frequently made in advance of the crop. Hence comes also the best sugar of the island, which is mostly imported in American bottoms into the U. States. The molasses from this port is always of the best quality, and much sought after by American and English shippers. Mayaguez exports also considerable quantities of oranges, citrons, and other fruit to the U. States. Pop. 11,878.

Ponce, situated 1½ m. N. of the S. coast of the island, is almost as important, in a commercial point of view, as Mayaguez, and its exports are nearly the same as in that port. It has a tolerable roadstead, and on the beach stand the custom house and warehouses. Pop. 17,416.

San Juan de Puerto Rico, the capital of the island, on a small island of the N. coast, lat. 18° 29′ N., lon. 66° 7′ W. Although possessing a magnificent port, considered one of the best on the island, San Juan is not the first commercial place, as the products exported thence are of a very inferior quality. Of the sugar shipped from this port, as well as from the other ports of the island, the U. States receive more than two thirds of the whole. Pop. 21,291.

Portrait and Miniature Painter, an artist who takes pictures of persons, or of the face, from life.

Port Royal and Augusta R.R. runs from Port Royal, S. C., to Augusta, Ga., 112 m. The Co. was chartered and the road opened in 1873, was sold under foreclosure in 1878, and purchased by the bondholders. Capital stock of the new Co., $750,000; funded debt, $1,750,000. The principal office is at Augusta.

Portsmouth, the name of three seaports. See GREAT BRITAIN, NEW HAMPSHIRE, and VIRGINIA.

Portugal, the most W. kingdom of Europe, forming the W. portion of the Iberian peninsula, is bounded by Spain and the Atlantic; lat. between 36° 57′ and 42° 8′ N., lon. between 6° 15′ and 9° 32′ W. The kingdom is divided into the 6 provinces of Entre Douro e Minho, Tras-os-Montes, Beira, Estramadura, Alemtejo, and Algarve; capital, Lisbon. Area, 35,843 sq. m.; pop. 4,441,037. The fundamental law of the kingdom is the "Carta constitutional," granted by King Pedro IV., April 29, 1826, and altered by an additional act, dated July 5, 1852. The crown is hereditary in the female as well as male line; but with preference of the male in case of equal birthright. The constitution recognizes four powers in the State, the legislative, the executive, the judicial, and the "moderating" authority, the last of which is vested in the sovereign. There are two legislative Chambers, the "Cámara dos Pares," or House of Peers, and the "Cámara dos Deputados," or House of Commons, which are conjunctively called the Cortes Geraes.

P. is not separated by any natural boundaries from Spain, which in general aspect it resembles; the mountains are chiefly prolongations of the Astorga, Castilian, and Toledo chains, the whole running from N. E. to S. W., but throwing off numerous branches; while again, the principal rivers, — as the Douro and the Tagus, flowing E., and the Guadiana S., — are merely the terminations of Spanish streams. There are only two extensive plains; one, the plain of Alemtejo, S. of the Tagus, the other S. of the Douro; but there are numerous fertile valleys between the mountains. The climate varies much in different places: on the coast it is very warm, especially to the S. of Cape Roca; and some parts of Alemtejo are so arid as to be uninhabitable, from the scarcity and badness of the water; yet there are abundance of rich tracts in other districts, to the productions of which considerable variety is given by the difference of elevation and of latitude. But the long-continued imbecility of the government, joined to the power as well as profligacy of the nobles and clergy, and the indolence of the people, have sunk the industrial arts in Portugal lower than in almost any other European State. Considerable progress has been made within the last twenty years, but agriculture and industry are still in a very backward condition. — The chief rural productions are, on the high grounds, wheat, oats, barley, flax, and hemp; in the warmer districts, vines and maize; and on the low grounds, rice; while in the sheltered valleys of the S. and central parts, oranges and lemons are produced, and the olive and other fruits are grown in various places. The live-stock are principally goats, hogs, and sheep; the last mostly in Beira. The chief woods are: in the N., oak; in the central provinces, chestnut; and in the S. provinces, kermes, cork, and pine. Minerals are abundant, but scarcely any mines except those of iron are worked. Salt is largely produced in the bays, especially in the lagoon of St. Ubes or Setubal. Manufactures, except perhaps the plate and jewelry of Lisbon, are inconsiderable; coarse woollens and linens are made in various provinces; silks near Lisbon; glass at Marinha Grande; cottons at Alcobaça and Thomar; and paper, earthenware, and other articles, in various places. The great staple of the country is wine, particularly the red variety called port, from Oporto, the place of shipment. See PORTUGAL (WINES OF). The principal commercial relations are with Great Britain, with which an intimate connection has been maintained since the beginning of the last century. This originated on the side of England, partly from jealousy of the pretensions of Louis XIV. to the crown of Spain, and partly from an attachment to *P.*, from her not being a manufacturing country, and likely in the opinion of the calculators of the day to be so much the more advantageous as a customer; reasons which jointly led, in 1703, to the celebrated Methuen treaty, the object of which was to favor the consumption of Portuguese wines in return for a similar preference for British manufactures. The relations then established have undergone several changes; but the deep-rooted taste for port in England has preserved the trade as great as ever. — For the year 1879 the total value of imports was $38,000,000; of exports, $26,000,000. On the total imports and exports Great Britain contributed about 50 per cent. Wine is the staple article of export from *P.* to England, the annual value amounting to over $8,000,000. The imports of British home produce into *P.* embrace cotton and woollen goods, and iron, wrought and unwrought. For the same year, the value of imports from the U. States, which almost exclusively consist of breadstuffs, was $4,927,161; of exports, $454,385, in which cork-bark entered for $314,522. — The commercial navy of *P.*, on Jan. 1, 1880, consisted of 843 vessels, including 40 steamers, of a total burden of 92,400 tons. The total length of railroad open for traffic was 674 m., with 154 m. more in course of construction. — The annual revenue of *P.* amounts to about $25,000,000, but there has been no budget for the last thirty years without a deficit. The public debt of *P.* dates from the year 1796, when the first loan of 4,000,000 milreis, or about $4,500,000, was raised to $416,864,460 in 1880, besides a large floating debt. The interest on the public debt has remained frequently unpaid. Portions of the national debt have also been repudiated at various periods; among others the loan contracted by Don Miguel in 1832. At times, as in the year 1837, the interest on the home debt has been paid, but not that on the foreign debt. By a royal decree of Dec. 18, 1852, the interest on the whole funded debt, internal and foreign, was reduced to 3 per cent. Many of the creditors protested against this act, but without effect. On the 19th of June, 1867, the Chamber of Deputies approved a bill presented by the government for raising 37,000,000 milreis to fund the floating debt and to negotiate 3 per cent external bonds at such a price that the interest shall not exceed ¾ per cent above the rate of the actual stock.

Money. The *Milreis*, or 1,000 *Reis* = $1.08. — The money of account is the *conto* of 1,000 milreis.

Weights and Measures. The French metric system of weights and measures was introduced in *P.* between the years 1860 and 1863, measures of length being first adopted, and weights afterwards, and it became compulsory from the 1st of October, 1868. The chief old measures still in use are: —

The *Libra*	. . .	=	1.012 lbs. avoirdupois.
" *Almude*	of Lisbon	=	3.7 gallons.
	" Oporto	=	5.6 "
" *Alquiere*	. . .	=	0.36 bushel.
" *Moio*	. . .	=	2.78 quarters.

Lisbon, the capital, and the principal seaport of *P.*, on the right bank of the Tagus, about 9 m. from its mouth, 310 m. W. S. W. of Madrid, in lat. 38° 42′ N., lon. 9° 8′ W. The harbor, or rather road, of Lisbon is one of the finest in the world,

and the quays are at once convenient and beautiful. Fort St Julian marks the northern entrance of the Tagus. It is built on a steep projecting rock. There is a light-house in the centre, 120 ft. above the level of the sea. At the mouth of the Tagus are two large banks, called the North and South *Cachops*. There are two channels for entering the river; the North or Little, and the South or Great Channel. On the middle of the South Cachop, about 1½ m. from Fort St. Julian, is the Bugio fort and light-house, the latter being 66 ft. in height. The least depth of water in the north channel on the bar is 4 fathoms, and in the south 6 The only danger in entering the port arises from the strength of the tide, the ebb running down at the rate of 7 m. an hour; and after heavy rains, when there is a great deal of fresh water in the river, the difficulty of entering is considerably augmented. When, at such periods, there is a strong wind from the sea, there is a complete break all over the bar; vessels moor up and down the river with open hawse to the southward. In some parts they may come within 200 yards of the shore, being guided by the depth of water, which, from nearly 20 fathoms in mid-channel, shoals gradually to the edge. —The climate is healthy, but variable; exposed to heavy rains and cold winds in winter. The commerce of Lisbon is extensive and has been much facilitated by the construction of railroads, which connect it with the chief towns of *P.* and Spain. The exports consist chiefly of wine, oil, fruit, and salt; and the principal imports are hemp, flax, silk, linen, cotton, and woollen goods, corn, iron, steel, hardware, dried fish, ale, porter, and coals. The domestic manufactures are silk, paper, soap, cottons, and woollens. There are also sugar-refineries and potteries. The goldsmiths and jewellers are highly esteemed. Meats and fruit are extensively preserved for export. The wealthiest merchants are for the most part English; but there are many French, Germans, Dutch, and Italians. — The *Bank of P.* (formerly *Bank of Lisbon*) was founded in Nov., 1846, being a reintegration of the old bank founded in 1822. Its capital is $12,000,000. Its rate of discount is invariably 5 per cent per annum for bills not having more than 3 months to run. It has the privilege of issuing notes, and which is more valuable, of having its claims on estates paid in full, provided the estate amounts to so much. This privilege, which is justly obnoxious, allows it to be more liberal or less cautious in discounting than it would be otherwise. It is bound to publish monthly statements of its situation. Pop. 253,496.

Oporto, or PORTO, a large city and seaport of *P.* on the N. bank of the Douro, about 2 m. from its mouth, lat. 41° 10′ 30″ N., lon. 8° 37″ 18″ W. It is a beautifully situated, well-built city, but its climate, damp and foggy in winter, becomes oppressively hot in summer, although a cold wind prevails on the river, and a chilling fog comes up the Douro every evening. The harbor of Oporto is a bar harbor, and can only be entered, at least by vessels of considerable burden, at high water; and it is seldom at any time practicable for vessels drawing more than sixteen feet. On the N. side of the entrance is the castle of St. Joao de Foz, whence a ledge of rocks, some of which are at all times above water, extends in a S. W. direction. The outermost of these rocks, named Filgueira, which is always visible. is left on the left or larboard side on entering. Cabedelo Point, forming the S. extremity of the entrance, is low and sandy. The bar being liable, from the action of the tides, and of sudden swellings or *freshes* in the river, to perpetual alterations, it is exceedingly dangerous for any vessel to attempt crossing it without a pilot. Pilots are always on the alert, and ready to offer their services when a vessel comes in sight, unless the weather be so bad that they cannot go off. On some few occasions of this sort, vessels have been detained for three weeks off the port, without having an opportunity of entering. The chapel of St. Catherine in a line with that of St. Michael leads over the bar. The ordinary rise of spring tides is from 10 to 12 ft., and of neaps from 6 to 8 ft. A light-house with a revolving light, having the lantern 220 ft. above the level of the sea, is erected on rising ground about 600 yards N. N. W. of St. Joao de Foz. The swellings of the river most commonly occur in spring, and are caused by heavy rain, and by the melting of the snow on the mountains. The rise of water at such times is frequently as much as 40 ft.; and the rapidity and force of the current are so very great, that no dependence can be placed on anchors in the stream. Fortunately, a *fresh* never occurs without previous warning; and it is then the practice to moor with a cable made fast to trees, or stone pillars erected on the shore for that purpose. — Oporto is the emporium of a large portion of *P.*, and enjoys a pretty considerable foreign commerce. The well-known red wine, denominated Port, from its being formerly exclusively shipped at this city, forms by far the largest article of export. Silk factories are established in and around the city, which has also manuf. of woollen, linen, and cotton goods, shawls, leather, earthenware, etc., shipbuilding yards, and iron-foundries. It is the chief manufacturing city in the kingdom. Pop. 89,194.

Portugal (WINES OF). See this heading in the Appendix.

Port-Warden, the officer in charge of a port; a harbor master.

Posnett, a kitchen utensil; a small skillet or pan.

Post, a piece of timber set upright, and intended to support something else. — A public office or employment; that is, a fixed place, or station, or situation. — Letter paper. — A stratum in a quarry which interrupts the regular strata. It is generally of small extent in one of its dimensions. — To register. — In book-keeping, to carry accounts from the books of original entry, or journal, to the ledger.

Postage, an official charge for the transmission of letters, or other mailable matter carried by land or by sea. See POST OFFICE.

Postage-Stamp, an adhesive or impressed government stamp of variable value, for affixing to letters and papers to pay the postal charge.

Postmaster General, the chief officer of the general post-office, usually a member of the cabinet, who has the superintendence of all matters connected with the interior and exterior postal arrangements of the kingdom, the transmission of the mails, and the appointment to vacant offices in his department.

Post Office. The post-office department of the U. States is in charge of a postmaster general, who is a member of the cabinet. He is aided by three assistant postmasters general; and there are besides three superintendents of the money order system, of foreign mails, and of the railway mail system. Including the officers above named, the total force of the department in Washington comprises 414 persons. The other officers and agents employed in the postal service consist of 40,855 postmasters, 5,659 contractors, 4,894 clerks in post offices, 2,359 letter-carriers, 1,091 railway post-office clerks, 241 route-agents, 134 local agents, and 54 special agents, making a total of 56,844. The number and value of postage-stamps, envelopes, and postal cards delivered during the fiscal year 1879 were as follows: —

Ordinary postage-stamps	774,358,780	$20,117,259.00
Newspaper and periodical stamps	1,552,172	1,088,412.16
Special stamps	15,667,600	365,957.00
Postal cards	221,797,000	2,217,970.00
Stamped envelopes, plain	80,806,700	2,160,417.92
Stamped envelopes, special-request	67,058,250	2,139,704.10
Newspaper wrappers	29,697,000	355,218.90
Official postage-stamps	14,201,822	624,999.95
Official stamped envelopes	17,209,150	469,011.90
Total	1,222,348,474	$29,538,950.93

The cost of the postal service greatly exceeds the income, the deficiency left to the charge of the treasury varying from 10 to 20 per cent, as shown in the following table of receipts and expenditures for the 25 years from 1855 to 1879: —

Year.	Receipts.	Expenditures.
1855	$6,642,136 13	$9,968,342.29
1856	6,920,821.66	10,405,286.36
1857	7,353,951.76	11,508,057.93
1858	7,486,792.86	12,722,470 01
1859	7,968,484.07	11,458,083.63
1860	8,518,067.40	19,170,609.89
1861	8,349,296.40	13,606,759.11
1862	8,299,820.90	11,125,364.13
1863	11,163,789.59	11,314,206.84
1864	12,438,253 78	12,644,786.20
1865	14,556,158.70	13,694,728.28
1866	14,436,986.21	15,352,079.30
1867	15,297,026.87	19,235,483.46
1868	16,292,600.80	22,730,592.65
1869	18,344,510 72	23,698,131.50
1870	19,772,220.65	23,998,837.63
1871	20,037,045.42	24,390,104.08
1872	21,915,426.37	26,658,192.31
1873	22,996,741.57	29,084,945.67
1874	26,471,071.82	32,126,414.58
1875	26,791,360.59	33,611,309.45
1876	28,634,197.50	33,263,487.58
1877	27,531,585.26	33,486,322 44
1878	29,277,516.95	34,165,084.49
1879	30,041,982.86	33,449,899.45

The present rates of postage are regulated by the laws of June 8, 1872, June, 1874, March 3, 1875, and March 3, 1879, as follows: — See, also, MONEY ORDER.

DOMESTIC MAIL-MATTER.

First-Class Matter. Matter which is in writing, or other matter containing a written inscription in the nature of personal correspondence, and matter which is sealed against inspection, are alone by their nature and the intent of the law first-class matter, and subject to the postage rate of 3 cts. for each half oz. or fraction thereof. — On local or drop letters, at offices where free delivery by carriers is established, 2 cts. for each half oz. or fraction thereof. — On local or drop letters, at offices where free delivery by carriers is not established, 1 ct. for each ½ oz. or fraction thereof.

Second-Class Matter. Mailable matter of the 2d class embraces all newspapers and other periodical publications which are issued at stated intervals, and as frequently as four times a year, and are within the following conditions: 1. It must regularly be issued at stated intervals, as frequently as four times a year, and bear a date of issue, and be numbered consecutively. — 2. It must be issued from a known office of publication. — 3. It must be formed of printed paper sheets, without board, cloth, leather, or other substantial binding, such as distinguish printed books for preservation from periodical publications. — 4. It must be originated and published for the dissemination of information of a public character, or devoted to literature, the sciences, arts, or some special industry, and having a legitimate list of subscribers: *Provided, however*, that nothing herein contained shall be so construed as to admit to the 2d class rate regular publications designed primarily for advertising purposes, or for free circulation, or for circulation at nominal rates.

Regular publications, designed primarily for advertising purposes, within the intendment of the preceding paragraph, are defined to be: 1. Those owned and controlled by one or several individuals or business concerns, and conducted as an auxiliary, and essentially for the advancement of the main business or calling of those who own or control them. — 2. Those which, having no genuine or paid-up subscriptions, insert advertisements free, on the condition that the advertiser will pay for any number of papers which are sent to persons whose names are given to the publisher. — 3. Those which do advertising only, and whose columns are filled with long editorial puffs of firms or individuals who buy a certain number of copies for distribution. — 4. Pamphlets containing market quotations, and the business cards of various business houses opposite the pages containing such quotations.

Publications of the 2d class, except as provided in the next paragraph, when sent by the publisher thereof, and from the office of publication, including sample copies or when sent from a news-agency to actual subscribers thereto, or to other news agents, shall be entitled to transmission through the mails at *two cents a pound* or fraction thereof, such postage to be prepaid, as now provided by law. — Publications of the 2d class, one copy to each actual subscriber residing in the county where the same are printed, in whole or in part, and published, shall go free through the mails; but the same shall not be delivered at letter-carrier offices, or distributed by carriers, unless postage is paid thereon at the rate prescribed in the preceding paragraph: *Provided*, that the rate of postage on newspapers (excepting weeklies), and periodicals not exceeding 2 oz. in weight, when the same are deposited in a letter-carrier office for delivery by its carriers, shall be uniform at *one cent each;* periodicals weighing more than 2 oz. shall be subject, when delivered by such carriers, to a postage of two cents each, and these rates shall be prepaid by stamps affixed.

Periodical publications on their receipt at the office of mailing shall be weighed in bulk, and postage paid thereon by a special adhesive stamp to be devised and furnished by the Postmaster General, which shall be affixed to such matter, or to the sack containing the same, or upon a memorandum of such mailing, or otherwise as the Postmaster General may, from time to time, provide by regulations — Publishers and news-agents must tender their newspapers and periodicals intended to be sent through the mails at the office of mailing, so that they may be weighed in bulk. The postage thereon must then be prepaid, according to the weight of the matter to be mailed, *by special adhesive stamps known as newspaper and periodical stamps*, which are furnished by the Department to postmasters for that purpose. *Ordinary postage stamps cannot be used for such matter*, nor can the newspaper and periodical stamps be used for any other purpose. After weighing the mail-matter thus received, and collecting the proper amount of postage thereon, the postmaster will give a receipt to the party mailing from a book of forms to be furnished by the Department. The stamps will then be affixed to the stub of the receipt, *and at once effectually cancelled.*

Postage on second-class matter at free-delivery post offices. Mailable matter of the second class, deposited in a letter-carrier post office for local delivery, shall be delivered through boxes or the general delivery on prepayment of postage at the rate of 2 cts. per lb.; but when delivered by carriers the following rates must be prepaid by postage stamps affixed: On newspapers (except weeklies), 1 ct. each, without regard to weight; on periodicals not exceeding 2 oz. in weight, 1 ct. each; on periodicals exceeding 2 oz. in weight, 2 cts. each. The rate on weekly newspapers of the second class, deposited by the publisher in a letter-carrier post office for local delivery, is 2 cts. per lb., whether the same are delivered by carriers or through boxes or the general delivery. — Second-class matter for city delivery, where the carrier system is established, should be separately made up at the office of publication, — that for delivery by the carriers of a post office being put in one package or bundle, — each article of mail-matter therein properly stamped, and that for delivery through the boxes of the post office by itself. If the separation is not made at the office of publication, each paper or periodical not properly stamped must be placed in the boxes or at the general delivery for delivery therefrom.

Sample copies of any publication cannot be mailed free in the county; they must be prepaid at the rate of two cents per lb. Whether to be mailed in or out of the county, they should be put up in single wrappers, and each package addressed to a person or firm should be plainly marked, in printing or writing, *sample copy.*

Mailable matter of the 2d class shall contain no writing, print, mark, or sign thereon, or therein, in addition to the original print, except as herein provided, to wit, the name and address of the person to whom the matter shall be sent, and index figures of subscription book, either written or printed, the printed title of the publication, the printed name and address of the publisher or sender of the same, and written or printed words or figures, or both, indicating the date on which the subscription to such matter will end.

Third-Class Matter. Mail-matter of the 3d class embraces books (printed and blank), transient newspapers and periodicals, circulars, and other matter wholly in print, proof-sheets and corrected proof-sheets and manuscript copy accompanying the same, prices current with prices filled out in writing, printed commercial papers filled out in writing (provided such writing is not in the nature of personal correspondence), such as papers of legal procedure, deeds of all kinds, way-bills, bills of lading, invoices, insurance policies and the various documents of insurance companies, hand-bills, posters, chromo-lithographs, engravings, envelopes with printing thereon, heliotypes, lithographs, photographic and stereoscopic views with title written thereon, printed blanks, printed cards; and postage shall be paid thereon at the rate of 1 ct. for each 2 oz. or fractional part thereof.

Upon matter of the third class, or upon the wrapper enclosing the same, the sender may write his own name or address thereon, with the word "from" above and preceding the same, and in either case may make simple marks intended to designate a word or passage of the text to which it is desired to call attention. There may be placed upon the cover or blank leaves of any book or of any printed matter of the third class a simple manuscript dedication or inscription that does not partake of the nature of a personal correspondence. — The "nature of a personal correspondence" referred to in the preceding section cannot be ascribed to the following, viz.: 1st. To the signature of the sender or to the designation of his name, of his profession, of his rank, of the place of origin, and of the date of despatch. 2d. To a dedication or mark of respect offered by the sender. 3d. To the figures or signs merely intended to mark the passages of a text, in order to call attention to them. 4th. To the prices added upon the quotations or prices current of exchange or markets, or in a book. 5th. To printed commercial papers, filled out in writing, circulars, hand-bills, etc. 6th. To instructions or requests to postmasters to notify the sender in case of the non-delivery of matter, so that he may send postage for its return. 7th. Lastly, to annotations or corrections made upon proofs of printing or musical compositions, and relating to the text or to the execution of the work. — All packages of matter of the third class must be so wrapped, with open sides or ends, that their contents may be readily examined by postmasters. — Third-class matter may be registered.

The limit of weight of packages is 4 lbs., except in cases of single volumes of books in excess of said weight, and books and documents published or circulated by order of Congress, or official matter emanating from any of the Departments of the Government, or from the Smithsonian Institution.

Fourth-Class matter. Mailable matter of the 4th class embraces blank cards, card-board, and other flexible material, flexible patterns, letter envelopes and letter-paper without printing thereon, merchandise, models, ornamented paper, sample cards, sample of ores, metals, minerals, seeds, cuttings, bulbs, roots, scions, drawings, plans, designs, original paintings in oil or water colors, and any other matter not included in the 1st, 2nd, or 3d classes, and which is not in its form or nature liable to destroy, deface, or otherwise damage the contents of the mail-bag, or harm the person of any one engaged in the postal service. Postage rate thereon, 1 ct. for each oz. or fractional part thereof. — Other articles of the 4th class which, unless properly secured, might destroy, deface, or otherwise damage the contents of the mail-bag, or harm the person

of any one engaged in the postal service, may be transmitted in the mails when they conform to the following conditions: 1st. They must be placed in a bag, box, or removable envelope made of paper, cloth, or parchment. 2d. Such bag, box, or envelope must again be placed in a box or tube made of metal or some hard wood, with sliding, clasp, or screw-lid. 3d. In case of articles liable to break, the inside box, bag, or envelope must be surrounded by sawdust, cotton, or spongy substance. 4th. In case of sharp-pointed instruments, the points must be capped or encased, so that they may not by any means be liable to cut through their enclosure; and where they have blades, such blades must be bound with wire, so that they shall remain firmly attached to each other. 5th. The whole must be capable of easy inspection. Seeds, or other articles not prohibited, which are liable from their form or nature to loss or damage, unless specially protected, may be put up in sealed envelopes, provided such envelopes are made of material sufficiently transparent to show the contents clearly, without opening.— Upon any package of matter of the 4th class the sender may write or print his own name and address, preceded by the word "from," and there may also be written or printed the number and names of the articles enclosed; and the sender thereof may write or print upon, or attach to any such articles, by tag or label, a mark, number, name, or letter, for purpose of identification.— The limit of weight of packages is 4 lbs.

Postal cards. The object of the postal card is to facilitate letter correspondence and provide for the transmission through the mails, at a reduced rate of postage, of short communications, either printed or written in pencil or ink. The matter desired to be conveyed may be either in writing or in print, or partially in both.— In their treatment as mail-matter, they are to be regarded by postmasters the same as sealed letters, and not as printed matter, *except that in no case will unclaimed cards be returned to the writers or sent to the Dead Letter Office.* If not delivered within 60 days from the time of receipt, they will be burned by postmasters; but they may be forwarded at the request of the party named in the address, the same as letters.— The postage of 1 ct. each is paid by the stamp impressed on these cards, and no further payment is required.— Postal cards are issued exclusively by the Department. Cards issued by private parties, which contain any written matter having the nature of personal correspondence, other than the address, cannot be passed through the mails at less than letter postage, as they are not "postal cards" within the meaning of the law.— In using postal cards, be careful not to write or have anything printed on the side to be used for the address, except the address; also be careful not to paste, gum (except an address tag or label), or attach anything to them. They are unmailable as postal cards when these suggestions are disregarded.

Unmailable. Liquids, poisons, explosive and inflammable articles, fatty substances easily liquefiable, live or dead animals (not stuffed), insects, and reptiles, fruits or vegetable matter, confectionery pastes or confections, and substances exhaling a bad odor; and every letter upon the envelope of which, or postal card upon which, indecent, lewd, obscene, or lascivious delineations, epithets, terms, or language may be written or printed, and all matter concerning lotteries, so-called gift concerts, or other similar enterprises offering prizes, or concerning schemes devised and intended to defraud the public, or for the purpose of obtaining money under false pretences.

Foreign Mails.

The rates of postage established by the Post Office Department of the U. States for correspondence exchanged between it and the countries and colonies of the Universal Postal Union, concluded in Paris, June 1, 1878, except Canada (1), are as follows: —

For prepaid letters, 5 cts. per 15 grams ($\frac{1}{2}$ oz.).— For unpaid letters received, 10 cts. per 15 grams ($\frac{1}{2}$ oz.).— For insufficiently paid letters or other articles received, a charge equal to double the amount of the deficiency.— For postal cards, 2 cts. each. — For newspapers, if not over 4 oz. in weight, 2 cts. each; if over 4 oz. in weight, 2 cts. for each additional 4 oz. or fraction thereof.— For printed matter of all kinds, commercial papers, and samples of merchandise, 1 ct. for each article or packet bearing a particular address, and for every weight of 2 oz. or fraction thereof; with a *minimum* charge of 5 cts. per packet of commercial papers, and a *minimum* charge of 2 cts. per packet of samples of merchandise; that is to say, for commercial papers not exceeding 10 oz. in weight, the postage is 5 cts., and if above 10 oz. in weight, 1 ct. for each two ounces or fraction thereof; for samples not exceeding 4 oz. in weight, 2 cts.; if above 4 oz. in weight, 1 ct. for each 2 oz. or fraction thereof. *Provided*, that articles or packets of printed matter, commercial papers, or samples do not contain any letter or note having the character of an actual and personal correspondence, and that they be made up in such manner as to admit of being easily examined.— For the registration fee on all correspondence, 10 cts.— No fee will be charged for return receipts for registered articles in cases where such receipts are requested.— The prepayment of the Union postage on ordinary letters is optional, but the postage on all other articles, except postal cards, which are necessarily prepaid, and registered articles, must be at least partially prepaid.

Payment of postage on every description of correspondence can be effected only by means of postage-stamps valid in the country of origin for the correspondence of private individuals. —(1). A list of the countries which were parties to the Paris Convention, or have since adhered to it can be seen in every post office. It now comprises all the States of Europe and their Colonies, the principal U. States of America, and India, Japan, Hong Kong (for the Chinese ports), Persia, Egypt, etc. —For Canada (including all the provinces of the Dominion), the rates of postage are the same as for the U. S. (see above, Domestic mail-matter), including newspapers sent from offices of publication in the U. States to regular subscribers in Canada. The packages of patterns and samples are limited to 8 oz., and the postage charge is 10 cts. per package; they must be so wrapped and enclosed as to be easily examined. No supplementary postage is chargeable for the reforwarding of postal packages of any kind within the interior of the Union.

Printed matter of all kinds. The following are considered as printed matter, viz.: Newspapers and periodical works, books stitched or bound, pamphlets, sheets of music, visiting cards, address cards, proofs of printing with or without the manuscripts relating thereto, engravings, photographs, drawings, plans, geographical maps, catalogues, prospectuses, announcements and notices of various kinds, whether printed, engraved, lithographed, or autographed, and in general all impressions or copies obtained upon paper, parchment, or card-board, by means of printing, lithographing, or any other mechanical process easy to recognize, except the copying press.— The following are excluded from the reduced postage, viz.: Stamps or forms of prepayment, whether obliterated or not, as well as all printed articles constituting the representative sign of a monetary value.—The character of *actual and personal correspondence* cannot be ascribed to the following, viz.: 1st. To the signature of the sender or to the designation of his name, of his profession, of his rank, of the place of origin, and of the date of despatch. 2d. To a dedication or mark of respect offered by the author. 3d. To the figures or signs merely intended to mark the passages of a text, in order to call attention to them. 4th. To the prices added upon the quotations of prices current of exchange or markets. 5th, and lastly. To annotations or corrections made upon proofs of printing or musical compositions, and relating to the text or to the execution of the work.

Printed matter must be either placed under band, upon a roller, between boards in a case open at one side or at both ends, or in an unclosed envelope; or simply folded in such a manner as not to conceal the nature of the packet; or, lastly, tied by a string easy to unfasten.— Address cards and all printed matter presenting the form and consistency of an unfolded card may be forwarded without band, envelope, fastening, or fold.— The maximum weight of printed matter is fixed at 2 kilograms (4 lbs. 6 oz).

Commercial papers. The following are considered as commercial papers, viz.: All instruments or documents written or drawn wholly or partly by hand, which have not the character of an *actual and personal correspondence*, such as papers of legal procedure, deeds of all kinds drawn up by public functionaries, way-bills or bills of lading, invoices, the various documents of insurance companies, copies or extracts of deeds under private seal written on stamped or unstamped paper, scores or sheets of manuscript music, manuscripts of works forwarded separately, etc. Commercial papers must be forwarded under band or in an open envelope. The maximum weight of commercial papers is fixed at 2 kilograms (4 lbs. 6 oz).

Samples. Samples of merchandise must conform to the following conditions: They must be placed in bags, boxes, or removable envelopes in such a manner as to admit of easy inspection. They must not have any salable value, nor bear any manuscript other than the name or profession of the sender, the address of the addressee, a manufacturer's or trade mark, numbers and prices. They must not exceed 250 grams in weight ($8\frac{3}{4}$ oz.), or the following dimensions: 20 centimetres (8 in.) in length, 10 centimetres (4 in.) in breadth, and 5 centimetres (2 in.) in depth.

Articles grouped together. It is permitted to enclose in the same packet samples of merchandise, printed matter, and commercial papers, but subject to the following conditions: 1. That each article taken singly shall not exceed the limits which are applicable to it as regards weight and size. 2. That the total weight must not exceed 2 kilograms (4 lbs 6 oz.) per package. 3 That the minimum charge shall be 5 cts. when the packet contains commercial papers, and 2 cts. when it consists of printed matter and samples.

Articles excluded from the mails. It is forbidden to send by mail: 1. Letters or packages containing gold or silver substances, pieces of money, jewelry, or precious articles. 2. Any packet whatever containing articles liable to customs duty. 3. Articles other than letters which are not prepaid at least partly, or which do not fulfil the conditions required in order to enjoy the reduced rate. 4. Articles of a nature likely to soil or injure the correspondence. There is, moreover, reserved to the government of every country of the Union the right to refuse to convey over its territory, or to deliver as well, arti-

cles liable to the reduced rate in regard to which the laws, ordinances, or decrees which regulate the conditions of their publication or of their circulation in that country have not been complied with, as correspondence of every kind which evidently bears inscriptions forbidden by the legal enactments or regulations in force in the same country.

Customs Duties. Printed matter, other than books, received in the mails from foreign countries under the provisions of postal treaties or conventions, is free of customs duty, and books which are admitted to the International mails exchanged under the provisions of the Universal Postal Union Convention, may, when subject to customs duty, be delivered to addressees in the U. States under such regulations for the collection of duties as may be agreed upon by the Secretary of the Treasury and the Postmaster General. It appears, however, that no books are absolutely exempt from customs duties, except those printed and manufactured more than twenty years; but collectors of customs may, in their discretion, remit duties on importations of single copies of books, of less dutiable value than one dollar, when such books are intended for the personal use of the addressees. — *Regulation governing the treatment of dutiable articles received in the mails from foreign countries, dated May* 16, 1879: When letters, sealed packages, or packages the wrappers of which cannot be removed without destroying them, are received in the U. States from a foreign country, and the postmaster of the exchange office at which they are received has reason to believe they contain articles liable to customs duties, he shall immediately notify the customs officer of the district in which his office is located, or the customs officer designated by the Secretary of the Treasury for the purpose of examining the mails arriving from foreign countries, of the receipt of such letters or packages, and their several addresses; and if any letter or package of this character be addressed to a person residing within the delivery of his office, the postmaster shall also, at the time of its arrival, notify the addressee or addressees thereof that such letter or package has been received and is believed to contain articles liable to customs duties, and that he or they must appear at the post office at a time in said notice to be designated, not exceeding twenty days from the date of said notice, and receive and open said letter or package in the presence of an officer of the customs. — Letters and sealed packages, or packages the wrappers of which cannot be removed without destroying them, which are supposed to contain articles liable to customs duties, and which are addressed to persons residing outside of the delivery of the U. States exchange office where they were first received from abroad, shall be forwarded, without longer detention than twenty-four hours, to their respective destinations, marked "supposed liable to customs duties," and upon their receipt at the offices of destination, the postmasters thereof shall notify the nearest customs officer and the parties addressed, in the manner and to the same effect as hereinbefore provided in the case of similar letters or packages addressed for delivery at the U. States exchange office where they were first received. — Provided, however, that nothing herein above contained shall authorize or allow customs officers to seize or take possession of any letter or sealed package while the same is in the custody of a postmaster, nor until after its delivery to the addressee: and provided further, that no letter or sealed package shall be detained at the office of delivery a longer period than may be necessary for the appearance of a customs officer and the addressee, in pursuance of the notices hereinbefore provided to be given. — Unsealed packages received in the mails from foreign countries, which are found on examination by customs officers to contain articles liable to customs duties, shall be delivered by the postmaster at the exchange office of receipt to the proper officer of the customs for the collection of the duties chargeable thereon, with notice of such delivery to the person addressed.

Miscellaneous Regulations and Suggestions. In order to avoid the delay consequent upon the return through the Dead Letter Office of short-paid letters, addressed to countries to which prepayment of postage is compulsory, care should be exercised in the weighing and stamping of such letters. In case of doubt it is safer to prepay at the higher rate. Delay may also be avoided by writing the name and address of the sender on the covers. — In the absence of special instruction to the contrary, where correspondence is marked for transmission by a route requiring prepayment, and the amount prepaid is insufficient for that route, it will be sent by some other route by which prepayment of postage is optional; but if there is no such route, and no means of obtaining full prepayment by notice to the sender, the correspondence will be sent to the Dead Letter Office. ☛ Directions given by senders on correspondence for foreign countries respecting routes of transmission desired will be observed whenever practicable. — The amount of postage due on unpaid or insufficiently paid correspondence received from foreign countries is plainly marked on the cover by the U. States exchange office through which the correspondence passes, and only the amount so marked as due should be collected. But in the case of mail-matter other than letters, which is discovered at the office of destination to contain a letter or other communication in writing, the postmaster at such office should levy postage thereon at letter rates for collection on delivery. — Liquids, poisons, explosive and inflammable articles, fatty substances, live or dead animals, reptiles, fruits or vegetable matter liable to decomposition, confectionery, pastes or confections, and substances exhaling a bad odor, excluded from transmission in domestic mails as being in themselves either from their form or nature liable to destroy, deface, or otherwise injure the contents of the mail-bags or the persons of those engaged in the postal service, are prohibited from transmission in the mails exchanged with foreign countries, as are also obscene, lewd, or lascivious books, pamphlets, etc., and letters and circulars concerning lotteries, so-called gift concerts, etc., also excluded from domestic mails — Certain articles, other than those above mentioned, which from their nature or form are liable to destroy, deface, or injure the contents of the mail-bags, or the persons of those engaged in the postal service, may be transmitted as samples in the mails to foreign countries when enclosed in the form prescribed for such matter in domestic mails. — Packets of patterns or samples of merchandise for despatch in the mails to foreign countries are restricted to *bona fide* trade samples or specimens having no salable or commercial value in excess of that actually necessary for their use as samples or specimens. Goods sent for sale, in execution of an order, or as gifts, however small the quantity may be, are not admissible. — The public should bear in mind that all matter received in the mails from foreign countries which is subject to customs duties, such as watches, jewelry, lace, silk, etc., is liable to seizure by the officers of the customs. — The Post Office Department assumes no responsibility for the delay, injury, or loss of either registered or ordinary correspondence for or from foreign countries, but it will, at the instance of senders or addressees, use the means at its command for the purpose of ascertaining the causes of such delay, injury, or loss, and preventing the recurrence thereof. — Letters conveyed in vessels not regularly employed in carrying the mails (commonly called "ship letters") are subject to double rates of domestic postage on delivery.

Post-Office Order. See MONEY-ORDER.

Pot, a mug; a general vulgar name for the quart measure; the fourth of a gallon. — A kind of paper and millboard, 17½ by 14½ inches. — To preserve viands, etc., seasoned in cases. — To enclose or cover in pots of earth. — To put new-made sugar into casks, so as to drain off the molasses.

Pot and Pearl-Ash Dealer, a dealer in wood ashes. See POTASH.

Potash [Fr. *potasse;* Ger. *Pottasche;* It. *sale alcali;* Sp. *potasa*], a term commonly applied to an impure carbonate of *P.*, obtained by the incineration of wood, lixiviating the ashes in barrels, first with cold and then with hot water, filtering the lye, and evaporating it to dryness in an iron pot. In this state, which is that of the *P.* of commerce, it still contains some vegetable matter not perfectly incinerated, to destroy which it is put into a crucible, and liquefied to an intense heat. The melted matter is then poured out on iron plates, where it hardens, and in this purer state is called *pearl ash.*

P. occur in hard, irregular masses or fragments, of a light bluish-gray color, somewhat caustic alkaline taste, inodorous, and very deliquescent. Pearl ashes are of a whitish color and pearly lustre, and of considerably purer and finer texture and appearance than the other. These commodities are valued according to their purity, estimated generally by their easy solubility in water, two parts of which should entirely and easily dissolve one part of pearl ash without the aid of heat; the residue, if any, consists of impurities. Ashes are used in the soap and glass manufactures, bleaching and scouring of linens and woollen cloths, and dyeing; also, when refined, in medicine, surgery, and other arts. They were formerly very extensively produced in this country, and exported; but their consumption has been much checked by the substitution of soda and chlorides of lime and soda for many purposes. For the year 1879, our exports (chiefly to France) amounted to 1,060,691 lbs., valued at $61,266. — *Bitartrate of P.* exists in considerable quantities in the juice of the grape, and in less as a deposit in wine-casks, forming a crystalline incrustation called *argol* or *crude tartar.* It is purified by solution and crystallization, which renders it perfectly white. When in fine powder, it is called *cream of tartar.* *Imp.* duty: crude *P.*, 20 per cent: calcined *P.*, 1½ cents per lb.; cream of tartar, 10 cents per lb.

Potato [Fr. *pomme de terre;* Ger. *Kartoffel;* It. and Sp. *patata*], the roots of the *Solanum tuberosum*, of innumerable varieties, and too well known to

require any description. The culture of this plant extends through the whole of Europe, a large portion of Asia, Australia, the S. and N. parts of Africa, and the adjacent islands. On the American continent, with the exception of some sections of the torrid zone, the culture of this root extends from Labrador on the E., and Nootka Sound on the W., to Cape Horn. It resists more effectually than the cereals the frosts of the North. In this country it is principally confined to the Northern, Middle, and Western States, where, from the coolness of the climate, it acquires a farinaceous consistence highly conducive to the support of animal life. It has never been extensively cultivated in Florida, Alabama, Mississippi, nor Louisiana,—perhaps from the greater facility of raising the sweet *P.*, its more tropical rival. Its perfection, however, depends as much upon the soil as on the climate in which it grows; for in the red loam on the banks of the Bayou Bœuf, in Louisiana, where the land is relatively new, it is stated that tubers are produced as large, savory, and as free from water as any raised in other parts of the world. The same may be said of those grown at Bermuda, Madeira, the Canaries, and numerous other ocean isles. The chief varieties cultivated in the Northern States are the Carter, the kidneys, the pink-eyes, the Mercer, the orange, the Sault St. Marie, the Merino, and the Western red; in the Middle and Western States, the Mercer, the long red or Merino, the orange, and the Western red. The Colorado beetle, which for several years was so destructive in the West, is now little feared there; in New England this *P.* pest was still very troublesome in 1880, but was generally subdued by handpicking, the application of Paris green to a limited extent, and other methods of warfare.

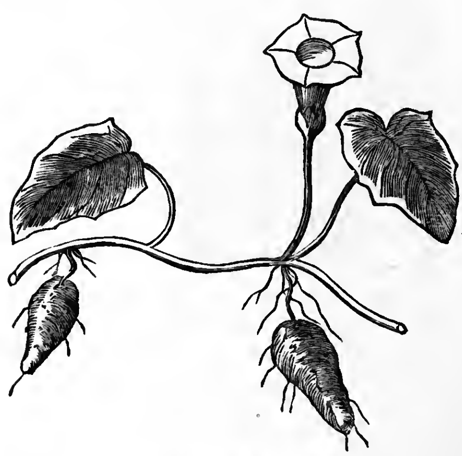

Fig. 406.—SWEET POTATO.

Sweet Potato. The sweet *P.*, *Batata edulis* (Fig. 406), is a native of the East Indies, and of intertropical America, and was the "potato" of the old English writers in the early part of the 14th century. It was doubtless introduced into Carolina, Georgia, and Virginia soon after their settlement by the Europeans, being mentioned as one of the cultivated products of those colonies as early as the year 1648. It grows in excessive abundance throughout the S. States, and as far N. as New Jersey and the S. part of Michigan. The varieties cultivated are the purple, the red, the yellow, and the white, the former of which is confined to the South.

Table showing the product, area, and value of the P. crop in the U. States for the year 1879 (*sweet potatoes not included*).—

States.	Bushels.	Acres.	Value.
Maine	7,000,000	70,000	$3,220,000
New Hampshire	4,480,000	40,000	2,240,000
Vermont	5,780,000	44,461	2,312,000
Massachusetts	3,415,000	32,524	2,049.000
Rhode Island	750,000	7,353	502,500
Connecticut	2,100,000	28,000	1,386,000
New York	39,300,000	374,286	16,506,000
New Jersey	5,800,000	53,704	3.016,000
Pennsylvania	13,500,000	150,000	5,805,000
Delaware	405,000	4,765	202,500
Maryland	1,525,000	16,944	1,021,750
Virginia	1,340,000	17,867	670,000
North Carolina	853,000	11,847	665,340
South Carolina	105,000	1,235	65,100
Georgia	....	....	....
Florida	....	....	....
Alabama	300,000	4,286	258,000
Mississippi	325,000	3,869	263,250
Louisiana	....	....	....
Texas	550,000	6,875	550,000
Arkansas	650,000	6,842	422,500
Tennessee	1,350,000	16,875	702,000
West Virginia	1,120,000	13,176	571.200
Kentucky	2.400,000	27,586	1,032,000
Ohio	11,300,000	125,555	4,520,000
Michigan	7,700,000	92,771	2,772,000
Indiana	5,800,000	69,047	2,204,000
Illinois	12,834,000	138,000	5,646,960
Wisconsin	11,500,000	127,778	4,025,000
Minnesota	2,300,000	34,848	1,012,000
Iowa	9.500,000	95,000	3,610,000
Missouri	6,250,000	69,444	2,750,000
Kansas	3,200,000	44,444	1,984,000
Nebraska	1,500,000	14,286	600,000
California	3,200,000	32,000	2,400,000
Oregon	860,000	6,143	550,400
Nevada, Colorado, and the Territories	1,100,000	10,476	715,000
	170,092,000	1,792,287	76,249,500

Our exports of *P.* for the year 1879 amounted to 625,342 bushels, valued at $545,109, of which 492,489 bushels, valued at $431,950, went to Cuba. *Imp.* duty, seed or other, 15 cents per bushel.

Potato-Digger, POTATO-LIFTER, a prong; also a kind of digging-machine to save labor in raising potatoes from the ground.

Potato-Flour, meal or farina prepared from the potato tubers.

Potato-Starch, the fecula prepared from the potato root, and forming a gum substitute, used extensively by calico-printers and cotton manufacturers. See DEXTRINE.

Pot-Herb, any culinary vegetable suited for soups or stews, etc.

Potichomanie, articles of glass ornamented inside in imitation of old china-ware, with paper or linen flowers and devices, and varnished.

Pot-Metal, a kind of stained glass.—A gray, brittle alloy of copper and lead,—about 6 oz. of lead to 1 lb. of copper,—used for making pots.

Potomac River, in Maryland and Virginia, rises in two branches, the north and the south, in and near the Alleghany Mountains, and forms, through nearly its whole course, the boundary between Virginia and Maryland. It is about 300 m. long, and enters Chesapeake Bay between Point Lookout and Smith's Point by a mouth 10 m. wide. At Alexandria it is a mile and a quarter wide, 290 m. from the ocean. It is navigable for ships of the line to the navy-yard in Washington, 300 m. from the sea, and 3 m. below the head of tidewater. Above this it is obstructed by numerous falls and rapids.

Potstone, a coarsely granular variety of steatite or soapstone, which, on account of its tenacity, infusibility, and the ease with which it may be turned in the lathe, is frequently made into culinary vessels.

Potted Meats, viands preserved by parboiling, etc., in small jars covered with grease, or enclosed in hermetically sealed tin cases.

Potter, a maker of earthen pots and ware.

Potter's Clay, plastic clay; clay suited for the manufacture of earthenware; a common name for fuller's earth.

Pottery. The facility of shaping a piece of soft clay into definite form is so great, that we need not wonder that the art of the potter is among the most ancient known to man. When a boy thrusts his thumb into a lump of clay to make a candlestick, he virtually becomes a potter; and as clay is to be met with, in some form or other, in most countries, the *P.* art must have arisen almost spontaneously. Some of the paintings and bas-reliefs on the tombs at Thebes show that the mode of making vessels in clay in use among the ancient Egyptians was very much like the simpler forms of the potter's art at the present day. After Europe began to emerge from the dark period of the middle ages, different countries gradually associated themselves with the production of various kinds of *P.*, many of which remain in repute to the present day The Moors of Spain showed their skill in enamelled earthenware tiles; Della Robbia, Giorgio di Gubbio, and Fontana produced beautiful specimens of *P.* in Italy; Palissy did the same in France; and later, Josiah Wedgwood, in England, who completely revolutionized the art. *P.* may be conveniently divided into two classes of baked stoneware *Porcelain*, consisting of a fusible earthy mixture, along with an infusible, which, when combined, are susceptible of becoming semi-vitrified and translucent in the kiln (see PORCELAIN); and *Pottery*, properly so called, which consists of an infusible mixture of earth, which is refractory in the kiln, and continues opaque. There are many kinds of *P*, noticed in this work under their particular names. See MAJOLICA, WEDGWOOD WARE, etc. — *Faience* and *Rafaelle Ware* are terms applied in art to the fine *P.* of the 16th and 17th centuries, consisting of a common earthenware ground, covered with a glaze, and enamelled with painted designs. In the U. States, the materials for many sorts of ware are good and abundant; but, owing to the cheapness and perfection of the *P.* imported from Europe, our manufacture has made little progress, being generally confined to the production of common earthenware and porcelain. Of late, however, some attempts have been made; porcelain of fair quality has been produced in some establishments, and it is easy to foresee that the time is not far distant when American industry will compete advantageously with the products of the Old World. The most important manufactories are located in the States of New Jersey, New York, Ohio, and Illinois. — The appraised value of earthen, stone, and china ware imported into the U. States during the year 1879 was $4,082,707, of which England contributed $2,939,041; France, $607,172; Germany, $303,600; and Japan, $110,026. *Imp.* duty: Brown earthen and common stoneware, gas retorts, and stoneware not ornamented, 25 per cent; stoneware above the capacity of 10 gallons, 20 per cent; china, porcelain, and parian ware, gilded, ornamented, or decorated, 50 per cent; the same, plain white, 45 per cent; all other earthen, stone, or crockery ware, n. o. p. f, white, edged, glazed, printed, painted, dipped, or cream-colored, composed of earthy or mineral substances, and including "Rockingham ware," 40 per cent.

Manuf Though the various kinds of *P.* and porcelain differ from each other in the details of their manufacture, yet there are certain general principals and processes which are common to them all. The ingredients for *P.* comprise various kinds of clay, combined with other substances according to the ware to be produced: the *alumina* of most kinds of clay, and the *silica* of most kinds of sand, being the main bases; then *potash* is useful as another ingredient for hard porcelain, *soda* for soft porcelain, *baryta* for stoneware; while common *P.*, encaustic tiles, crucibles, earthenware, etc., result from certain admixtures of lime and oxide of iron with the two bases. Generally speaking, the more the alumina, the harder the ware; the more the silica, the softer the ware: the latter is less dense, and bears less heat, than the former. Both in materials and in granular structure porcelain is about midway between *P.* and glass. The first process of manufacture consists in *preparing the slip*. The name slip is given to the mixture of ingredients, whether for porcelain or for *P.*, brought to a creamy liquid state. If flint is one of the ingredients, the flints are burned for many hours, broken into small fragments by stampers, ground into powder, and passed through sifters. Any other stony materials, such as felspar and broken earthenware, are in like manner ground and reduced in water to a creamy liquid. The clays — blue, brown, yellow, white, as the case may be — are *blunged*, that is, worked about with water until they form a smooth pulp; if very stiff, they require to be cut and intermixed in a pug-mill before being blunged. The flinty cream and the clay are then mixed, and passed through sieves to render the mixture as fine and smooth as possible. This mixture, constituting *slip*, is boiled for many hours in a steam-heated vessel called a *slip kiln;* the water evaporates, and the slip assumes a stiffer consistency. The mixture then requires *ageing*, the influence of time to work certain chemical changes in the mass, aided by mechanical processes called *wedging* and *slapping*. The clay being thus brought into the requisite state, is next shaped into articles of earthenware by one of the three processes named *throwing*, *pressing*, and *casting*. Of these, the throwing is the most ancient, and is performed at the potter's wheel or lathe, which consists of an upright shaft, about the height of a common table, on the top of which is fixed a disk of wood, of sufficient diameter to support the largest vessel which is made. The thrower, seated with one foot on each side of the wheel-head,— with his elbows supported on his knees, when his hands require to be kept steady, — takes a lump of clay, dashes it down upon the centre of the revolving disk, and with both hands kept wet by occasional dipping in water, squeezes up the clay into a high conical lump, and again forces it down into a mass, to get rid of any superfluous air-bubbles. With one hand, or finger and thumb, in the mass, he then gives the first rude form to the vessel, and with a piece of horn, shell, or porcelain, which has the profile of the shape of the vessel, he smooths the inner surface, giving it the proper shape, and removing the inequalities left by the fingers The vessel is now lifted off the wheel, placed on a board, and carried into the open air, or a warm room, where it parts with its moisture sufficiently to allow of the operation of *turning*, which, in the case of earthenware, does not much differ from the turning of wood, ivory, or metal. When the vessel has been wrought to the required thickness by this process, its handle (if it requires one), which has been moulded in a metal tube of the required shape, is affixed to it by a little clay and silicate paste. The processes of pressing and casting are simply processes of moulding We now come to the process of firing, by which articles of *P.* are made to

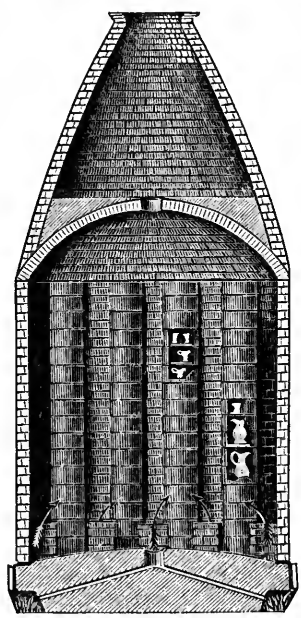

Fig. 407. — SECTION OF POTTERY KILN.

lose their pliability, and acquire solidity and density. The temperature at which they are fired has a great influence on their texture and character; and as the novel effect of the first firing is to convert the article into a hard, sonorous substance, having the appearance of biscuit, by which name it is known, and which is more or less porous, a second firing is necessary to remove the porosity, and to give a durable smooth surface, not very liable to tarnish. When the article has been withdrawn from the kiln, it is either simply glazed, or printed, painted, or ornamented in some way, and then glazed, the glaze, in either case, consisting of the ingredients of some kind of glass, fritted or melted together in a furnace, reduced to a powder, and stirred up in water. When the article in biscuit has been dipped into this, it is passed through the glaze or glass oven; the powder melts into a glass, and reveals the pattern, which, being a white opaque powder, it had temporarily concealed. The glaze we have mentioned is the one most commonly used; but there are many kinds of glazes, which may be distinguished as transparent, opaque, and colored, and which are severally used, according to the kind of ware to be glazed, and the ingredients of which are very various. The felspars and certain volcanic scoriæ are used where the point of fusion is required to be high. A second class of non-metallic glazes includes common salt, potash, boracic acid, phosphate of lime, and sulphate of baryta. A third class of glazes consists of earthy and metallic substances simply mixed together, etc. All articles of *P* which have a variety of colors are ornamented either by the pencil or by impressions taken from copper-plates, both processes taking place while the article is in its biscuit state, and prior to its being glazed. Painting on earthenware and porcelain is performed with a camel's-hair pencil, and with colors such as are used in enamel-painting, being all metallic oxides, and ground up with substances which vitrify by heat; such as glass, nitre, and borax, in certain proportions. Oil of turpentine is the usual vehicle for the color and flux; and while painting, the appearance of the colors is often dingy and unpleasing, but when the oil and other matters have been driven off by the heat of the furnace, the colors are revealed in their natural brilliancy. When an article of *P.* is to be printed, the printer, having first melted the oily coloring substance by laying it on a hot iron-plate, transfers it with a leathern muller to a copper-plate engraved with the required pattern, also made hot. The superfluous color is carefully cleaned off; the plate is covered with a piece of unsized paper, which has been first brushed over with a lye of soft-soap, and then the whole is passed through a press, the heat of the plate drying the paper, and enabling it the more readily to take up the color. The impression thus taken is received by a girl, called the "cutter," who cuts it into the required form, and hands it to the "transferrer," who puts it on the biscuit, and rubs the surface till it is completely attached to the clay. The article is then left for a short time to imbibe the coloring matter, after which the paper is washed off with clean water, and the process completed. Of the subsequent operation of glazing, we have already spoken.

Potting, the operation of pouring soft sugar into earthen moulds, and placing wet clay saturated on the top to refine it; pouring new-made muscovado sugar into casks to cure it, or drain off the molasses.

Pottinger, an earthen jar.

Potting-House, a place where plants are shifted into pots.

Pottle, an English dry measure of $\frac{6}{16}$ of a gallon.

Pouce, the French inch = 1.0658 inches.

Pouch, a small bag. — A shot-belt. — A cartridge-box.

Pouchong, a black tea; a superior kind of Souchong.

Pou-de-Soie, a fabric of silk and wool for ladies' dresses.

Poudrette, an artificial manure composed of night-soil and decomposed vegetable matter, dried and deodorized.

Pouilly. See BURGUNDY WINES.

Poult, a young chicken; a pullet.

Poulterer, a dealer in eggs, poultry, and game.

Poultice, an external application for promoting the suppuration of tumors, or abating painful inflammation: poultices are made of bread, of linseed-meal, mustard-meal, etc.

Poultry, a general name for every kind of domesticated fowls, reared about a house or farm, embracing a large variety of birds which are eaten as food.

Poultry-Salesman, a wholesale poulterer, who receives hampers of poultry from the country on consignment for sale.

Pounce, a resinous powder used to sprinkle over fresh-written documents, consisting of gum sandarac, pounded and sifted very fine, and mixed with the calcareous bone of the cuttle-fish crushed.

Pounce-Paper, a transparent paper for drawing or tracing, etc., made in Carlsruhe; it is free from oily, greasy, or other objectionable substance, and will therefore bear sketching and painting on.

Pound, a weight of many countries. Two different pounds are used in England and America, the troy and the avoirdupois. The avoirdupois is divided into 16 ounces (each 437.5 grains); each ounce into 16 drachms; each drachm is 27.34 grains, consequently the avoirdupois pound contains 7,000 grains. The troy pound, used in weighing the precious metals, drugs, etc., contains 96 drachms and 5,760 grains. When not qualified, the pound is always understood to be the avoirdupois pound. See APOTHECARIES-WEIGHT, AVOIRDUPOIS, and TROY-WEIGHT. — A money of account. The pound sterling, or sovereign of 20*s.*, is the principal current gold coin of Great Britain. Its value in the U. States is $4.84. — The level space of a canal between locks.

Pounder, a term used to express the weight of a shot, as a 6-pounder, or to distinguish the size of a cannon, as a 32-pounder.

Pourie, a jug with a spout.

Pout, the young of some fish and birds, as a chicken, a young partridge, a small haddock.

Powder, anything ground down to dust; perfumed dust for the hair or skin; pulverized drugs; an explosive compound. See GUNPOWDER.

Powder-Belt, a leather belt to carry gunpowder.

Powder-Blue, a name for smalts.

Powder-Box, a lady's toilet-table box for holding violet-powder and a puff.

Powder-Flask, POWDER-HORN, a metal or other case with a spring, carried by sportsmen, holding gunpowder to charge a rifle or fowling-piece.

Powder-Mill, a place in which gunpowder is made.

Powder-Puff, a pad of swan's down used by ladies to powder the skin.

Power, the product arising from the multiplication of a number into itself; as a cube is the third power. — Any force, whether of a man, a horse, wind, water, steam, etc., which, being applied to a machine, tends to produce motion. By the term *mechanical power* is signified one of the six simple machines, viz., the lever, the inclined plane, the screw, the wheel and axle, the wedge, and the pulley. In optics, power generally expresses the effect produced by any optical instrument, as *magnifying power, illuminating power*, etc. See HORSE-POWER.

Power Loom, a weaving machine worked by steam or water power.

Power of Attorney, a letter or warrant, forming a legal authority to act for another. — Where a power is special, and the authority limited, the attorney cannot bind his principal by any act in which he exceeds that authority; but the authority of the attorney will be so construed as to include all necessary means of executing it with effect. — An authority to enter up a judgment against two persons will not warrant a judgment against one alone. — The declarations of one holding a letter of attorney, made in the course of his dealings as such, with a third person, will bind

the principal equally with the articles to which they relate. — Written powers are always to receive a strict interpretation. — The adoption of one part of a transaction, done under an assumed agency, is an adoption of the whole. — Notice given to an agent, relating to business which he is authorized to transact, and while actually engaged in transacting it, will in general enure as notice to the principal. — Where an act of agency is required to be done in the name of the principal, under seal, the authority of the agent must be under seal. An authority to convey lands must be in writing; though it is otherwise of a contract to convey. — It is not necessary that a letter of attorney to convey land should be recorded; though when duly proved or acknowledged, in the same manner as conveyances of real estate, it may be so recorded. When such letter of attorney has been recorded, the instrument revoking it must also be recorded in the same office. — When a person has the power to do an act in his own right, he may delegate it to an attorney; but an attorney cannot delegate his authority to a substitute, unless expressly authorized so to do. Whenever a substitute is regularly appointed, he must act in the name of the principal. — The authority of an attorney ceases when it is withdrawn by the principal; but where the letter of attorney forms part of a contract, and is security for money, or for the performance of any act which is considered valuable, it will be deemed irrevocable in law — The revocation of a letter of attorney takes effect, as to the attorney, from the time it is communicated to him; and as to third persons from the time they have notice of it. — If a power of attorney is to be used in a different State or Territory from that in which the principal resides, it should be duly acknowledged or proved. Where the attorney resides, or is to transact business, in a foreign country, the acknowledgment should be made before a notary.

FORMS.

§ 1. *General Form of Power of Attorney.*

Know all men by these presents: That I, A. B., of , in the County of , and State of New York, have made, constituted, and appointed, and by these presents do make, constitute, and appoint, C. D., of, etc., my true and lawful attorney, for me, and in my name, place, and stead *[*set forth the subject-matter of the power*], giving and granting unto my said attorney, full power and authority to do and perform all and every act and thing whatsoever, requisite and necessary to be done, in and about the premises, as fully, to all intents and purposes, as I might or could do if personally present, with full power of substitution and revocation, hereby ratifying and confirming all that my said attorney, or his substitute, shall lawfully do, or cause to be done, by virtue thereof.

In witness whereof, I have hereunto set my hand and seal, the day of , in the year one thousand eight hundred and .

Sealed and delivered in the presence of G. H. A. B. [L. S.]

§ 2. *Power of Attorney to Collect Debts.*

Know all men by these presents, etc. [*as in* § 1, *to the* *, *and then add*]: and to my use, to ask, demand, sue for, collect, and receive, all such sums of money, debts, rents, dues, accounts, and other demands whatsoever, which are or shall be due, owing, payable, and belonging to me, or detained from me, in any manner whatsoever, by E. F., of, etc., his heirs, executors, and administrators, or any of them [*or*, by any person or persons residing or being in the State of], giving and granting unto my said attorney, etc. [*as in* § 1, *to the end*].

§ 3. *Power to Collect Rents.*

Know all men by these presents, etc. [*as in* § 1, *to the* *, *and then add*]: and for my use, to ask, demand [*insert*, distrain for, *if necessary*], collect, and receive, all such rents, and arrears of rent, as now are or may be, or shall hereafter grow, due, or owing to me. from E. F., R. F., and L. M., of, etc., or any of them, as tenants or occupiers of any lands, tenements, or hereditaments, belonging to or claimed by me, situate in the County of , in the State of , or which may be due from, or payable by, any other person or persons whomsoever, as tenants, occupiers, lessees, or assignees, of any term or terms, of such lands, tenements, or hereditaments, or any of them, or any part or parcel of them; and upon receipt thereof, to give proper acquittances and sufficient discharge thereof; giving and granting unto my said attorney, etc [*as in* § 1, *to the end*].

§ 4. *General Power to Transact Business.*

Know all men by these presents: That whereas, I, A. B., of have this day leased the premises known as No. , in the of , for the term of years next ensuing after the day of next, for the purpose of conducting, carrying on and transacting, at the place and number aforesaid, the business of a general commission merchant, and more particularly, the receiving, selling, and vending, on commission, all kinds of dry and wet groceries: Now, therefore, I, the said A. B., have made, constituted, and appointed, and by these presents do make, constitute, and appoint, C. D., of , aforesaid, my true and lawful attorney, for me and in my name, place, and stead, to conduct, carry on, and transact the business aforesaid, at the place and number aforesaid; to receive on commission, sell, and vend all and every such goods, wares, and merchandise, appertaining to the business aforesaid, as my said attorney may deem meet and proper; to make and execute, sign, seal, and deliver, for me and in my name, all bills, bonds, notes, specialties, or other instruments in writing whatsoever, which shall be necessary to the proper conducting, carrying on, and transacting the business aforesaid, and to do and perform all and every act and deed, of whatsoever name or nature, legally appertaining to the same, binding me as firmly and irrevocably by such deed or performance, as if I were myself present thereto consenting; hereby ratifying, confirming, and allowing whatever my said attorney shall lawfully do in the premises.

In witness, etc. [*as in* § 1].

§ 5. *General Custom House Power.*

Know all men by these presents, etc., [*as in* § 1, *to the* *, *and then add*:] to receive and enter at the custom house of the district of , any goods, wares, or merchandise, imported by me, or which may hereafter arrive, consigned to me; to sign my name, and to seal and deliver, for me and as my act and deed, any bond or bonds which may be required by the collector of the said district, for securing the duties on any such goods, wares, or merchandise: also, to sign my name to, seal and deliver, for me, and as my act and deed, any bond or bonds, requisite for obtaining the debenture on any goods, wares, or merchandise, when exported; and generally to transact all business at the said custom house, in which I am or may hereafter be interested or concerned, as fully as I could if personally present. And I do hereby declare that all bonds signed and executed by my said attorney shall be as obligatory on me as those signed by myself, and this power shall remain in full force until revoked by written notice given to the said collector.

In witness, etc. [*as in* § 1].

§ 6 *Power to Effect Insurance.*

Know all men by these presents, etc., [*as in* § 1, *to the* *, *and then add*:] to effect insurance on [*insert the property to be insured*,] with the Fire [*or*, Marine] Insurance company, in the city of , on such terms as to my said attorney shall seem meet and proper; and I hereby empower my said attorney to sign any application for said insurance, any representation of the condition and value of said property, articles of agreement, promissory, or premium note, and all other papers that may be necessary for that purpose; and also to cancel and surrender any policy he may obtain, and on such cancelling, or the expiration thereof, to receive any dividend, return premium, or deposit, that may be due, and on such receipt full discharge to give therefor; giving and granting unto my said attorney, etc. [*as in* § 1, *to the end*].

§ 7. *Substitution of an Attorney.*

Know all men by these presents: That I, C. D., of , by virtue of the power and authority to me given, in and by the letter of attorney, of A. B., of , which is hereunto annexed, do substitute and appoint E. F., of , to do, perform, and execute, every act or thing which I might or could do, in, by, and under, the same, as well for me, as being the true and lawful attorney and substitute of the said A. B., hereby ratifying and confirming all that the said attorney and substitute, hereby made and appointed, shall do in the premises, by virtue hereof, and of the said letter of attorney.

In witness, etc. [*as in* § 1].

§ 8. *Revocation of a Power of Attorney.*

Know all men by these presents: That whereas, I, A. B., of, etc., in and by my letter of attorney, bearing date the

day of , in the year one thousand eight hundred and , did make, constitute, and appoint C. D., of, etc., my true and lawful attorney, for me, and in my name, to, etc., [*here copy the language of the letter of attorney*,] as by the said letter will more fully appear: now, therefore, I, the said A. B., have revoked, countermanded, annulled, and made void, and by these presents do revoke, countermand, annul, and make void, the said letter of attorney, and all power and authority thereby given, or intended to be given, to the said C. D.

In witness, etc. [*as in* § 1].

Poy, a steering pole; a rope-dancer's balancing pole.

Practice, to carry on a profession; the employment of a medical man or lawyer. The good-will of a medical man's practice or patients, is often sold.

Praline [Fr.], burnt almonds; sugared almonds.

Prammerant [Ger.], a subscriber.

Pratique, a certificate of having performed quarantine.

Prawn, a kind of large shrimp.

Precious Metals. See this heading in the Appendix.

Precious Stones or Gems are names given to stones prized for their brilliant lustre, transparency, and richness of hue, particularly to those used in jewelry. Among the gems that are cut, the diamond is the most valued for brilliancy of lustre, or *water*, as it is termed. The other stones that are chiefly used for gems are the ruby, sapphire, emerald, aquamarine, topaz, garnet, chrysolite, hyacinth, tourmaline, and many varieties of quartz, as opal, amethyst, agate, onyx, etc. These stones are all described in this work under their various names. The art of carving gems is of great antiquity, though it is doubtful whether the ancients were able to cut the diamond or carve the emerald and topaz. The Eastern nations are yet unacquainted with the proper mode of cutting and polishing the diamond. Among the Greeks the art of gem-cutting was carried to great perfection. Many celebrated names of engravers before the era of Alexander have been handed

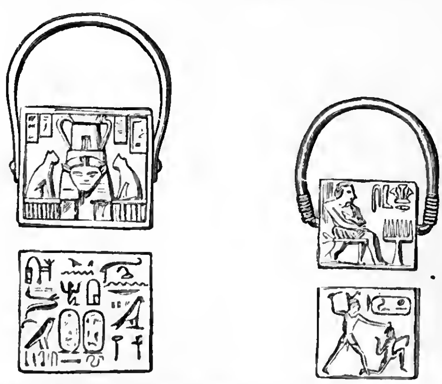

Fig. 408.—Egyptian Rings with Chalcedony Revolving Tables Engraved on Both Sides.

down. Theodore of Samos engraved a lyre on a celebrated emerald belonging to King Polycretes 750 years B.C., which the owner, to immortalize himself, threw into the sea. The Egyptians and Hebrews practised the art. The Egyptians used green jasper, chalcedony, and cornelian, and many interesting specimens of their work have been preserved (Fig. 408). With the introduction of Christianity, the art languished, and after the 7th century almost entirely disappeared, until it was revived by the Italians in the 15th century. In 1500 Ambrose Caradopo, an Italian, engraved the portrait of a father of the church on a diamond, and sold it to Pope Julius II., a great patron of

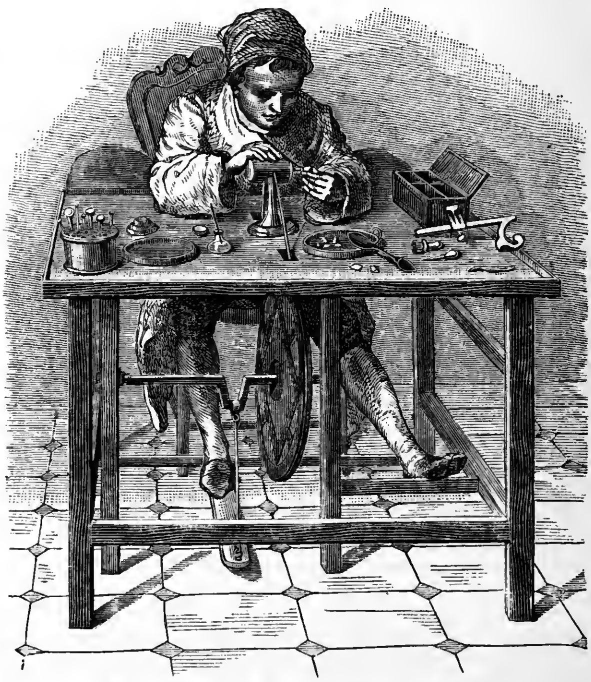

Fig. 409.—Dutch Engraver in Precious Stones at Work.

the arts, for $27,500. Since its revival, modern masters have more than rivalled the productions of the ancient engravers.—Many of the *P. S.* have been produced artificially by crystalizing mixtures containing their component parts at a very high temperature. Artificial rubies, corundum, spinelle, garnet, opal, and emerald have been thus produced, possessing the properties of the real stones, in color, hardness, and form. Minute crystals of carbon have been obtained by voltaic action, but as yet no diamond of any appreciable size has been formed artificially.—Imitations of *P. S.* are made by a transparent and dense glass, or *paste*, containing a large percentage of oxide of lead, and colored by metalic oxides. In many of these the tints of the real stone are so exactly imitated, and they are cut and polished with such skill, as to deceive any but the most experienced judges.—The *P. S.* imported into the U. States during the year 1879 were valued at $3,842,007. The value of importations from England was $1,668,061; from France, $1,784,146; from Germany, $396,634.

Engraving. "The apparatus employed by modern engravers in *P. S.* consists of a foot lathe attached to a small table, upon which is fixed a little pillar for holding the horizontal pulley, which is the receptacle for the cutting tool (Fig. 409) This part of the apparatus is called the mill. The tools are soft iron wire spindles carefully annealed and nicely fitted to the hollow axis of the pulley. Only one is used at a time. When set in

its place it projects through the bearings of the pulley, one end extending horizontally on the right-hand side of the operator, who sits at his work in front of the table. This extremity of each tool is fashioned for its special work. Most of them terminate in a small disk, the edge of which, as it rotates rapidly, cuts lines in the stone held up against it, the tool being fed with diamond dust and oil The larger sized disks are only about a quarter of an inch in diameter, and from this they are made of decreasing sizes down to $\frac{1}{150}$ of an inch, when the disk can scarcely be distinguished by the eye from the stem. They are also variously shaped for special kinds of cutting. The stone intended to be engraved is usually shaped by the lapidary, and is sometimes set by the jeweller before it is engraved. If not set, the engraver secures it to a wooden handle by the cement known as the lapidary's, or if set, he secures it in a notch in a piece of cork. The polish is removed by roughening the face with a suitable cutting powder, as the tools work better upon a rough surface, and the outline of the design, which is next marked with a brass point, is the more conspicuous. The area thus enclosed is then sunk by the tools to a suitable depth; and within this the details of the design are successively introduced and excavated. For the parallel lines, called color lines, a thicker disk with two cutting edges is employed, its form being that of a little pulley; the two edges are just as far apart as the lines they are intended to cut, and as one pair is cut the stone is moved so as to bring the outer edge of the disk into the groove marked by the other edge, and thus the work goes on step by step over the surface to be thus "colored." The plan must be perfectly understood by the artist at the commencement of his work, and as it goes on he watches the effect produced with the aid of a magnifying glass conveniently attached to a stand over the tool and occasionally takes a proof of his work in wax. After the stone is engraved the polish is restored to the flat surface by a pewter polishing disk or lap fed with rotten stone and water. The engraved portions are polished with great care, first by using in the mill copper tools charged with diamond powder; this buries itself more deeply in the copper than in the iron tools, and a smoother surface is thus obtained. Boxwood tools charged with still finer diamond powder are next used, and after these copper tools charged with rotten stone and water. The harder gems, excepting the diamond, which is engraved with the greatest difficulty, are better adapted for this process than those of softer quality. The latter are liable to hold the diamond powder and cause it to wear out the tools; they do not when finished present such smooth and highly polished surfaces as the harder stones. The amethyst is considered as soft a stone as can be cut very smoothly. Cornelian and bloodstone are of close texture, and admit of excellent work; the ruby cuts slowly, but small pieces are apt to flake off. The sapphire is firm and close; it cuts slowly, but presents beautifully smooth surfaces." — *The American Cyclopædia. Imp. duty*: *P. S.*, not set, 10 per cent; set, 25 per cent. Imitations, not set, 40 per cent; set, 30 per cent.

Preen, a clothier's forked tool; a bodkin.

Preface, the introductory observations to a published work.

Preference-Stock, that which takes the first dividend before other share capital, in a company.

Premises, names, titles, etc., at the beginning of a deed; lands or houses.

Premium, a rate paid for insurance. See INSURANCE. — Something given to invite a loan or bargain; an advance paid by purchasers of shares, stock, etc., above the par price. A reward or bonus offered by government to stimulate trade.

Prescott, a fire-insurance Co., located in Boston, Mass., organized in 1827. *Statement*, Jan. 1, 1880: Cap. stock paid up, $200,000; net surplus, $88,924. Risks in force, $14,681,177; premiums, $176,872. Premiums received from the organization of the Co. to date, $1,000,295; losses paid, $426,560; dividends paid to shareholders, $110,000.

Prescription, a direction; a memorandum or receipt, from a medical man, of medicines to be made up.

Prescriptive Right, a title acquired by a long use, time, or custom.

Presentment, in the Law of Bills of Exchange. It is incumbent on the holder of a bill to present it in certain cases for acceptance alone, and in all cases for payment, or for acceptance and payment together. It is necessary that bills payable a certain period after sight be presented for acceptance, that the point from which the time runs may be fixed. In other cases it is not necessary to present for acceptance until the final *P.* for payment; but it is in all cases prudent, as, on acceptance, the paper acquires superior negotiability, and, on dishonor, the drawer and indorser become immediately liable. The only rule as to the time of presenting bills, payable at a certain time after sight, is, that it must be "within a reasonable time." Of this "reasonable time" no better account can be given than that the law sanctions what is established by the usage of trade in each class of cases. *P.* for acceptance should be made at the place of abode of the drawee, or, if he be a man of business, at his place of business. It is the duty of the holder to use every reasonable means to discover the drawee, if he has left his prior residence, or is otherwise difficult of access. The bankruptcy of the drawee is not notice of dishonor, and cannot excuse want of *P.* If a bill has been presented for acceptance, and dishonored, and the dishonor notified, the holder is not required to present again for payment to preserve his recourse. If an acceptance is qualified, as by naming a place of payment, the qualification must be attended to in the *P.* for payment. Where a place of payment is inserted in the body of a bill, it must be there presented, to preserve recourse. The bill must be presented at proper business hours, and on this point the usage of the place and profession must be kept in view; but it will effectually meet any objection on the ground of untimely hours, to show that there was an authorized person on the spot, who, when the bill was presented, refused to honor it. Drawers and indorsers are discharged from liability, unless a bill be presented for payment on the proper day.

Preservation of Food. See this heading in the Appendix.

Preserve, a general name for fruit preserved with sugar or brandy.

Press, a collective name for newspapers and their writers. — A machine by which anything is pressed or an impression taken. See HYDRAULIC-PRESS, LITHOGRAPHIC-PRESS, PRINTING-PRESS, etc.

Pressed-Glass, articles of glass forced into a mould, by a machine, which thence take the required form and markings, and differs from blown glass.

Pressing-Board, a tailor's ironing board for smoothing seams of garments on.

Press-Keys, small shaped pieces of brass used by bookbinders to hold the strings tight in a sewing press.

Pressman, a mechanical printer, who works at the press, and takes off impressions on paper, whether from type, stone, wood-cuts, or metal plates.

Press-Pin, an iron bar or prizing lever for turning the screw of a bookbinder's press.

Pressurage, the juice of the grape extracted by the press.

Pressure-Gage, a register of the pressure of steam.

Preston. See GREAT BRITAIN (SEAPORTS).

Preston-Salts, bottles of smelling-salts used by females, containing carbonate of ammonia in small pieces, with a drachm of the following mixture added, viz.: oils of bergamot, cloves, and lavender, and the strongest solution of ammonia.

Price, the exchangeable value of any article estimated in money. The *P.* of any commodity is, in the general case, permanently regulated by the quantity of labor and capital expended in obtaining it at the original storehouse of nature; in other words, by the cost of production, including, of course, the ordinary or average rate of profit.

This is the natural *P.* of a commodity. The actual or market *P.*, at any particular time, is influenced by the existing proportion between supply and demand; and is subject, as this proportion varies, to perpetual fluctuations; but the cost of production constitutes, as it were, a centre, to which it has a constant tendency to approach. Whenever it sinks below this point, production, having its expenses no longer repaid, is discontinued, and the supply of commodities diminished, until their value become again sufficient to pay the labor and capital necessary to bring them to market. On the other hand, if the market *P.* should at any time be elevated above the cost of production, labor and capital will, according to the invariable laws of competition, be drawn to the production of the articles which had acquired this extraordinary value, and the supply will be increased until their market *P.* fall back to its natural level. The general tendency of the mutual competition of buyers and sellers in all mercantile communities is to preserve both *P.* and quantity from great and sudden fluctuations. Thus, when supply exceeds demand, and the *P.* of a commodity is lowered, individuals are always found ready to employ their funds and credit in purchasing a portion of the surplus, with a view of retaining it and realizing a profit when the altered relation of supply to demand shall have led to an enhancement of *P.*; which, again, is through this operation rendered less excessive than it would otherwise become. It sometimes happens, however, that speculations, instead of limiting the vibrations of *P.*, render them more irregular, and force them to wider extremes. This is generally produced through miscalculation, acted upon by a loose and expansive system of credit, under the influence of which many are encouraged to leave their own track and compete with the proper dealers in a commodity as speculative purchasers of it. The excitement thus produced too often changes the sober industry of the merchant into the feverish ardor of the gambler; means are strained and responsibiiities stretched in effecting purchases, until, prices having reached an extravagant height, a general attempt is made to realize the golden dream by selling. A recoil then takes place, the whole illusion is dissipated, and in a market glutted with the stocks of the needy or ruined speculators, the fall of *P.* becomes as excessive as its previous elevation.

Price-List, a list of articles offered for sale, with the prices for each article.

Prices Current, a published list or tabular statement of the ruling market-prices of the day for merchandise and produce.

Pricker, a bodkin. — A toothed instrument used by workmen for stabbing or marking leather, paper, etc. — A marline-spike with a wooden handle used in sail-making. — In blasting, a priming-needle.

Prickle-Yellow. See Yellow-Wood.

Prie Dieu [Fr.], a kneeling-desk for prayers.

Prill, a solid lump of metal from ore.

Prillion, tin extracted from the slag.

Primage, a charge in addition to the freight of a ship. It was originally intended as a gratuity to the captain for his particular care of the goods, and is sometimes called hat-money; but it now belongs to the owners or freighters by charter-party of the vessel, unless by special agreement the whole or portion of it is assigned to the captain. It is collected with the freight. The rate or manner of making this charge depends chiefly upon the custom of the department of trade in which the ship is engaged. Very commonly it is a rate, as 5, 10, or even 15 per cent upon the amount of the freight. In some trades it is a rate per hogshead, etc., and in some cases it is not allowed, the word primage being cancelled or omitted, and the words in full being added to the stipulated rate of the freight.

Prime, superior, excellent, of high grade or quality. — In French, a premium, money advanced. — To charge the pan of a gun with loose powder. — To lay a train, to ignite a mine, etc. — To give a first coat of paint.

Prime Movers. Before a machine can be set to work — whether to forge an anchor or to head a pin, to blow a furnace or to stamp a shilling, to weave calico or to cut lucifer splints — there must be taken into account the force which is to set everything in motion, the machine that is to move the machines. Hence engineers are called upon to pay great attention to what are called *prime movers*, and to study those which may be the best or the cheapest under given circumstances. Muscular power, water power, wind power, and steam power are the chief agencies whereby machinery is put in motion; and the *P. M.* comprise, in effect, everything that belongs essentially to the development of these kinds of power.

Prime Mess. See Pork.

Primer, a name for some varieties of type, as *Long Primer*, which is larger than Bourgeois and smaller than Small Pica; and *Great Primer*, which is intermediate in size between English and Paragon.

Prince Edward Island, the smallest province of the Dominion of Canada, is situated between lat. 46° and 47° N., lon. 62° and 64° 30′ W. It is situated in a recess, on the W. side of the Gulf of St. Lawrence, and is separated from New Brunswick and Nova Scotia by the Strait of Northumberland, which at its narrowest part is only 9 m. wide. It is about 140 m. in length, and from 4 to 34 m. in breadth; area, 2,173 sq. m.; pop. 94,041. Its capital, Charlottetown, is situated on the Hillsborough River, near the S. coast, and has 8,807 inhabitants.

The island is connected with the mainland by telegraphic cable. During the season of navigation weekly lines of steamers connect with Quebec and with Halifax and Boston Navigation generally closes about the middle of December, and is resumed about the middle of April or beginning of May. During this time mails and passengers are conveyed across the Strait in ice-boats which ply between Cape Traverse in *P. E. I.* and Cape Tormentin in New Brunswick. The climate is much milder than that of the adjoining continent, and the air generally free from fogs. The winter is long and cold, but the summer is eminently fitted to promote the growth and maturity of all ordinary cereals. The inhabitants are almost exclusively engaged in agriculture, considerable attention, however, being devoted to the fisheries. The principal grain-crop is oats. There is a considerable export trade in horses and sheep, the island being well suited for rearing them The yearly imports from the U. States average in value about $400,000, chiefly consisting of breadstuffs; exports, $200,000, chiefly fish and eggs.

Prince's Metal, an alloy of copper and zinc in the proportion of 72 parts of the former to 28 of the latter, or sometimes consisting of 75 per cent of copper and 25 of zinc.

Principal, capital laid out at interest. — The head man or leading member of a house.

Principal and Agent. An agent, in the widest acceptation, means a person employed to transact any description of business for another, the person so employing him being termed the "Principal." An attorney employed to transact law-business, is called his employer's agent. There are several commercial persons, whose duties and rights are in most instances explained

under separate heads, who possess more or less of the character of agency, such as factors, brokers, superintendents of works, confidential clerks or managers, shipmasters, bank-officers, holders of *del credere* commissions, and commercial agents.

Constitution of the Contract. — An agent may be constituted by direct writing, or his authority may be implied from his situation. In some cases the former description of appointment is necessary. To enable an agent to bind his principal by a deed under seal, he must be appointed by a similar deed. Authority to accept, draw, and indorse bills per procuration, may be given verbally. See BILL OF EXCHANGE. Commercial agents receive the most ample and important powers by simple letter, which may either be general, authorizing them to conduct a particular line of business, and to perform the train of transactions connected with it; or specific, and applicable only to some named transaction; as, where a merchant employs a commission-agent to sell or purchase a particular lot of goods. Implied agency arises from the position of the parties; a slight circumstance will resolve the contract of master and servant into that of principal and agent, in as far as respects third parties. If the master have allowed his servant to buy for him on credit, he is answerable for what the servant may buy, though without his authority, if it be in the line of transactions which the servant was permitted to enter on, and if the dealer was not warned of the want of authority in the particular case. Other limited authorities may likewise be extended by implication. Thus, a broker employed to purchase has no authority, as broker merely, to sell for his principal. But if the principal has allowed him to clothe himself with the apparent ownership, or has given him the power of disposition, he cannot afterwards reclaim the goods from a third person, to whom the broker has made an unauthorized sale of them. The authority to draw, accept, and indorse bills, and even to grant guaranties (though this is an extreme case), may be presumed from circumstances implying the principal's recognition of such a course. In all cases, the extent of the sanction will be for the consideration of a jury. The implied agency may continue after the parties have ceased to have connection with each other, unless there is notice of the change, or from the time which has intervened since previous transactions. Strangers are not entitled to infer without inquiry that the connection continues. An act done in the way of agency by one not duly authorized, will be confirmed by any act of assent on the part of him for whom he acts.

Authority of Agent. — Where the authority of the agent is limited, he cannot bind his principal beyond it; but authority may be enlarged as well as created by implication, as above. Authority to do particular acts is held to include the power of using the necessary means of accomplishing them. Thus, a broker employed to effect a policy may adjust the loss, and refer it to arbitration; but authority to collect, discharge, and compound debts, does not authorize the agent to negotiate bills received in payment. In pursuance of an old doctrine of the civilians, that a delegate cannot delegate his authority, an agent cannot depute his duty to another, unless specially empowered to do so. Written instructions receive a strict interpretation, but they are viewed through the medium of the usages of trade and the necessity of the case. Thus, where one gave a letter of attorney, containing extensive powers to buy and sell, and to do "all and singular such further and other acts, deeds, matters, and things, as should be requisite, expedient, and advisable to be done," with special power to "indorse, negotiate, and discount, or acquit and discharge the bills of exchange, promissory notes, or other negotiable securities, which were or should be payable to him, and should need and require his indorsement," it was held not sufficient to authorize the raising of money by acceptances; nor in the same case was another power by which the granter authorized his agent, " for him and on his behalf, to pay and accept such bills of exchange as should be drawn or charged on him by his agents or correspondents as occasion should require," of avail as to the acceptance of a bill which had not been drawn by one who was his agent to that effect. But on the other hand, where an agent was employed to proceed with and complete extensive mining operations abroad, implying a large and not easily predefined outlay of capital, he was found entitled to raise money by drafts after having exhausted a letter of credit. The agent's authority as respects third parties is measured by the duties he has to perform, as interpreted by the usages of trade. For example, he may be appointed to transact a certain description of business, and be particularly instructed not to perform certain acts which are understood in ordinary practice to accompany his duties. In such a case, when he accounts with his principal he is responsible for strict adherence to his instructions; but the public are entitled to rely on his holding the authority generally accompanying his situation, and those who are not specially aware of the contrary will be safe in so dealing with him. Such is the case where the appointment is of a general nature, as that of a broker, a factor, an attorney. Persons receiving these designations are entitled to do all things consistent with the duties of their offices, unless they are restricted; and the public are entitled to view them as unrestricted, unless the contrary be known. The duty of a factor being to sell, it has been held that he can sell on credit in those trades where such is the usual course of dealing; but it was found that he could not pledge. But when the authority is special to do a particular act, or where the agent is doing that which is not a part of the duties of his situation in a commercial sense, those who deal with him must examine his powers, and the principal is not answerable if he exceeds them. The distinction has been thus stated in regard to the sale of a horse: " If a person keeping livery stables intrust *his servant* with a horse to sell, and direct him *not* to warrant, and the servant did nevertheless warrant him, still the master will be liable on the warranty, because the servant was acting within the general scope of his authority, and the public cannot be supposed cognizant of any private conversation between the master and the servant: but if the owner of a horse send a stranger to a fair *with express directions not to warrant the horse*, and the latter act contrary to the orders, the purchaser can only have recourse to the person who actually sold the horse, and the owner is not liable on the warranty.

Agent's Obligations. — The first duty of an agent is to follow his instructions, and, where he has received none, this duty resolves itself into an adherence to the proper practices of trade in the capacity in which he is employed. Every breach of his authority is at the agent's own peril, though done with the intention of benefiting his principal. If it be unsuccessful, he is responsible; if it be successful, the advantage is reaped by his employer. But if the principal takes the benefit of an

act transgressing his instructions, he adopts it, and exonerates the agent. The latter is bound to exert all care and diligence in the execution of his trust, and to use all means consistent with honesty for benefiting his employer. He is not, however, bound to sacrifice his own interest in paying that minute attention to the affairs of his employer which may gain for him petty advantages at larger sacrifices of his own. The usual definition of what is expected of him is, that he shall treat his employer's affairs as if they were his own, and do corresponding justice to them according to their importance. It would not, however, relieve an agent from the consequences of neglecting the affairs of his principal, to prove that he had been equally careless of his own; the diligence required of him is that which a prudent man takes in his own affairs. If an agent undertakes a task requiring skill and experience, he is responsible for possessing the requisite amount of these qualities. An agent cannot be bound to perpetrate a fraud for his employer, — thus, where an agent employed to sell by auction, was privately instructed not to sell under a certain sum, and in breach of the instruction, but in obedience to law, sold to the highest bidder, he was found not responsible. It would have been otherwise had the instructions been to *set up* at a certain price. In selling, an agent should, if not instructed, obtain the best price which can be got. Unless he hold a *del credere* commission (which see), he is not responsible for the credit of the purchaser. If he knows of the insolvency of the purchaser, he becomes liable if he nevertheless give credit; and if an agent, selling to a person notoriously in discredit, gives credit on the part of his principal, but takes ready money in his own personal dealings, the presumption against him will be very strong. In purchasing, if the agent deviate in price, quality, or kind, from his instructions, the purchase must go to his own account, unless his employer adopt it; and it is said that if the principal has advanced money on the goods, he may dispose of them as if he were agent for the agent, if he be at such a distance that they cannot easily and safely be restored. But the principal must make his election speedily, for he will not be entitled after delay to return the goods upon the agent's hands. An agent ought not to place himself in a situation where he has an interest adverse to that of his principal; and there are many circumstances under which, if he do so, he will be liable to make good the real or presumed injury occasioned. An agent employed to sell cannot be himself the purchaser, nor can one employed to purchase be the seller. An agent employed to purchase cannot buy goods at wholesale, and take the retail profits, though he show that his employer pays no more than he would have done had he employed another person. An agent ought to give early notice of his transactions, according to their nature and importance; what is a due fulfilment of this duty will generally depend on the circumstances of the particular case, and the custom of merchants. The agent must pay over moneys received to his principal without undue delay. If the agent take credit for the price in account with the purchaser, he is precluded from pleading that he has not received it. The agent is responsible for the money which he receives, but he is not so for its being absolutely realized to his constituent, if he have taken the proper and customary method of making it over to him. If it is customary in the profession to purchase the bills of persons apparently in good credit, or to lodge the money in a bank, and if, on either of these plans being adopted, the maker of the bill or the banker fail, the agent will not have to make good the loss. If an agent, however, place the money so paid him in a bank, without any mark to show that it is his constituent's and not his own, and the bank fail, he will be responsible, because he cannot be permitted to pitch upon any sum of money lodged in his own name, as the money of his constituent, when the person responsible for it has failed. It is an agent's duty to keep clear accounts of his transactions for his employers, making them carefully distinct from his own. Where an agent had for many years neglected to keep accounts, and had withheld part of his principal's money, an injunction was granted to restrain the transfer of the whole of certain stock discovered to have been invested in his own name, till he should distinguish on oath how much of it was bought with the money of his principal. But where a considerable time has elapsed, the natural presumption (if there be nothing to contradict it) will be, that an account has been demanded and rendered. Agents must hold any interest they receive on the money of their principal for his behoof, unless where it is the practice for such interest to form part of the agent's remuneration. Agents are not in general liable for interest of money lying dead in their hands; but some classes of agents are bound to invest the moneys paid to them.

The Agent's Rights. — The agent is in the general case entitled to commission or remuneration for his exertions. This is either ordinary or *del credere;* and where none is stipulated, the usage of trade will fix the amount. Where a person performed services for a committee, under a resolution entered into by them, "that any service to be rendered by him should be taken into consideration, and such remuneration be made as should be deemed right," no action lay, as the resolution was held to import that the committee were arbiters in the matter. Where a solicitor lends his own money, he is held not entitled to commission; nor has an agent any claim for commission on an illegal consideration. In other words, if, in stating the services for which he demands remuneration, he has to state the performance of an illegal act, he will not be remunerated, though his principal may have got the benefit of it. But unless the illegality be clear on the face of the transaction, the employer will not relieve himself by proving that illegal acts were covenanted to be performed in connection with it. Commission may be forfeited as damages for mismanagement. Besides their commission, agents are entitled to be repaid the disbursements proper to the performance of the duties confided to them, and especially those necessary for the preservation of the property in their hands. Agents are not in the general case entitled to insure, unless justified by usage or special direction; but it is said that if an agent, acting for the best, but without orders, insure a cargo on account of the lateness of the season, or other good cause, he is entitled to charge the principal with the premium. What payments of agents are to be reimbursed becomes often a question of great nicety. Where the authority is doubtful, the advantage to the principal must be clear; and an agent, however good his intentions, will not be reimbursed for payments to which, in mistake, he believes his employer to be liable. An agent is not entitled to take upon himself the payment of the debt of his principal, for the sake of his own credit, unless he have guaranteed it.

Nor is he entitled to recover the expense occasioned by his own blunder; and action is decided on for the expense attending an illegal transaction, on the principle which regulates commission in a similar case. To enable them to make good their demands, factors and other agents having property in their hands, have a lien thereon for their commission and costs.

Principal's Responsibility to Third Parties. — In enforcing any contract entered into by his agent, the principal is subject to any objections arising from the conduct of the agent, in the same manner as if he had acted similarly for himself. When an agent deals as if he were a principal, a purchaser is entitled to set off the price of a purchase against a debt due to himself by the agent. Where a purchaser is not aware of the merely representative character of the agent, he is safe in paying to him as a principal. Where the agent holds a *del credere* commission, the purchaser may pay him, though he have received notice to the contrary from the employer; and where the agent has a lien on a balance, the price amounting to such balance may be paid him. The claims of the principal against third parties in such cases will depend upon the nature of the agency, and on how much room there may be for the presumption that the agent is acting for himself. In this respect a factor, who has goods in his possession, and may appear to be the absolute owner, is in a different situation from a broker who is not intrusted with possession. The principal has action against third parties who have wrongfully come into possession of his property through the agent's fraud or mistake; it would appear that in the former case he is entitled to recover, when the circumstances are such that if the mistake had been committed by himself he would recover, and in the latter only against a participator in the fraud. The properly authorized acts of the agent, between the principal and third parties, are in the eye of the law the acts of the former. Delivery to the agent is delivery to the principal, and bars stoppage *in transitu;* but a person who has charge of the goods for the mere purpose of facilitating their conveyance from place to place, is not an agent to this effect.

Print, to stamp or impress. — Anything printed, as an engraving or picture taken from an engraved plate, calico stained with figures, etc. — A stamp for butter. — To publish. — *In print*, printed and published; *out of print*, no longer published.

Print Colorer, an artist who tints or paints black engravings or prints.

Print Cutter, a workman who carves blocks of wood with figures, for printing calico, paper-hangings, etc., or who makes butter prints or other moulds.

Printer, one who prints with letter-press or copper-plates, or who stains calico.

Printers, a name among manufacturers for gray cotton goods used for printing purposes, made in several widths.

Printers'-Blanket Maker, a manufacturer of stout plate roller-cloths and swanskins, used by copper-plate and letter-press printers, and of the plain and twilled lappings and machine blankets used by calico-printers.

Printers'-Frames, upright wooden frames on which the letter-cases of type for compositors are placed.

Printers'-Ink Maker, a manufacturer of printing-ink. See Ink.

Printers' Joiner, a workman who makes the wood-work, etc., required in printing, such as frames, cases, etc., and cuts up the furniture used for making proper margin and in blocking the chases.

Printers' Liquor, also called iron liquor, a liquid without spirit, thrown off the retorts as vapour, and then condensed through worms, which is used as a mordant by calico-printers.

Printers' Rollers, composition rollers used for inking the forms of type, by letter-press and other printers, made of treacle, glue, and other materials; roller-cloths, varying in width, weight, and fineness, used by calico-printers and others.

Printers'-Rule Cutter, a preparer of the lengths of brass, etc., rules, used by printers to divide columns of newspaper-type, or other work.

Printers' Smith, a workman who makes iron work for printers.

Printers' Wood-type Cutter, an artist who shapes and carves the large fancy letters of wood used in job-printing, and which are made from ten-line size up to fifty-line and upwards.

Printing. This, one of the most valuable of all the practical arts, virtually began when *any* impression of *any* object was obtained upon another substance. But, in the sense usually understood, the Chinese seem to have invented the art. A piece of paper was cemented down upon a smooth block of wood; a penman wrote a page-full of words or hieroglyphics on the paper; an engraver cut the block in conformity with the writing; the remaining paper was washed off; and then the block was ready to be printed from with any kind of ink. Any number of impressions could be taken from such a block; but then as many blocks were needed as there were pages in the book. Whether derived from any Oriental source or an independent invention, such block-printing came into use in Europe about the year 1400 — not for books, but for playing-cards and for single-page publications. Coster, a Dutch printer of such articles, introduced about 1420 the plan of cutting up an engraved block into numerous pieces, which could be interchanged, and thus made available for printing many different kinds of books in succession, whether the pieces were separate words or separate letters. Thus *movable wood types* could be substituted for *block prints.* Somewhere about 1440, Gutenberg, at Mainz, invented (as is supposed) some mode of carving separate type-letters out of small pieces of metal; but it was kept secret. At length, about 1450, Gutenberg, Faust, and Schœffer, in partnership, put in operation a plan of casting the types in melted metal. How much each contributed to the invention is not now known; but the first result of their labor appears to have been a printed edition of a Papal indulgence, struck off in 1453. Faust, when the partnership ended, was more successful than either of the other two, and was popularly believed to have had the advantage (or disadvantage) of Satanic agency: hence the legend about the Devil and Dr. Faustus. Printing from cast metal types being thus established, the art spread, during the remainder of that century, to various parts of Europe. The alphabetical letters at first employed were *old Gothic*, or what is now called *black letter;* but this was almost entirely superseded in later times by *Roman* type, and occasionally by *Italic*, or sloping. Every part of the printing art has of course undergone improvement during the last four hundred years; but it is indisputable that the application of steam power to the working of the presses has been the most vital extension of all, — one of the greatest aids to civilization, indeed, that the world has seen.

In some kinds of printing (such as *letter-press*) the ink is at the surface of the printing block or plate, and not in the sunken parts; in others (such as *copper-plate*) the ink is in the sunken parts, and not on the surface; while in a third kind (such as *lithography*) there is no apparent depression of the surface, but the ink is prevented from touching certain parts by chemical action. The chief practical details are described in the following lines; but subordinate matters are noticed under a multitude of other headings.

With one or two exceptions, every letter, point, and mark used in printing a book, newspaper, or other article, is cast on a distinct and separate body or stalk. This letter is called a *type*. In *type-founding*, the formation of the *punches* constitutes the initial step. A punch is an exact prototype of the cast letter, so far as the face of it is concerned. After this original has been formed by the means of cutting, punching, and filing, it is hardened, and its face being struck into a piece of copper, a *matrix* is formed. This matrix is fitted with the greatest nicety into a carefully adjusted piece of mechanism, called a *mould*. An alloy, consisting of lead, tin, antimony, and sometimes copper, is poured in a molten state into this mould, and when the metal sets the type is dexterously and quickly removed. Although these operations are sufficiently complicated, an expert workman will cast in an hour 500 types. When the letters leave the mould, several operations have to be performed upon them in order to render them fit for the printers' purpose. A collection of types, such as is necessary in ordinary circumstances for the printing of a work, is called a *font*, or *fount* [Fr. *fonte*, a casting], and should contain Roman and Italic letters, points, figures, spaces, and other peculiarities. The several letters of the alphabet are required in very different proportions. In printing English works they are about as follows: a 8,500, b 1,600, c 3,000, d 4,400, e 12,000, f 2,500, g 1,700, h 6,400, i 8,000, j 400, k 800, l 4,000, m 3,000, n 8,000, o 8,000, p 1,700, q 500, r 6,200, s 8,000, t 9,000, u 3,400, v 1,200, w 2,000, x 400, y 2,000, z 200, ff 400, fi 500, fl 200, ffi 150, ffl 100, æ 100, œ 60 (these last seven are called logotypes, or types containing two or more letters on one body), , 4,500, ; 800, : 600, . 2,000. In addition to these there are dotted and accented letters, in quantities from 100 to 250; numerals 0 and 1 to 9, ranging from 1,000 to 1,300 each; brackets, parentheses, marks of references, etc. The types consist of the letters of the alphabet, of three kinds: —

Capitals. — A B C D E F G H I J K L M N O, etc.
Small capitals. — A B C D E F G H I J K L M N O, etc.
Lower-case. — a b c d e f g h i j k l m n o p q r s, etc.

The above are called Roman letters.

Capitals. — *A B C D E F G H I J K L M N O, etc.*
Lower-case. — *a b c d e f g h i j k l m n o p q r s t, etc.*

These last two are *Italic* letters. The number of capitals in a fount range, for the several letters, from 80 to 800; small capitals, about the same. *Spaces* are pieces of metal formed like the bodies of letters, and are used for separating the words. They are cast of different thicknesses: hair spaces are extremely thin — about 3,000 of them are required; of thin spaces 8,000; of middle spaces, 12,000; and of thick spaces, 18,000, are the numbers required with a fount of the above extent. *En-quadrats* are spaces equal in thickness to the letter *n*, of which 5,000 are supplied; an *em-quadrat* has a body exactly square, and equal to the shank of the body of the letter *m*, of which 2,500 are required. There are, also, larger quadrats, used for filling up blank lines, and the spaces at the ends of paragraphs, or in pieces of poetry. Types are of various sizes. Beginning with the largest, the subjoined specimens show the various sizes commonly used by American printers on book work: —

Great Primer, English, Pica,
Small Pica, Long Primer, Bourgeois,
Brevier, Minion, Nonpareil, Agate, Pearl, Diamond, Brilliant.

Composing. When a work is to be printed, and the size of the page and type decided upon, the author's manuscript, called in a printing office *copy*, is given to the compositor. The types lie before him in a receptable termed a *case*. Cases are always in pairs: the one called the upper-case is divided into 98 boxes, of equal size, in which are contained the capitals, small capitals, accented letters, etc. The lower-case is divided into 53 compartments, of unequal size, in which are deposited the small letters, figures, spaces, etc., the types most in use having the largest recesses assigned to them. The compositor holds in his hand a little brass or iron frame, called a *composing-stick*, which, having one side movable, is capable of being adjusted to the required width of the page or column. With the copy placed before him, the workman begins to gather his types, letter by letter, until he has formed a word; this word he separates from the next by a space; and so he goes on until he has composed a line. Arrived at the end of his line, he proceeds to *justify it*, that is, he increases or lessens the space between the words, until the line is tolerably tight in his composing-stick; in doing this he has to equalize the spacing as much as possible, uniformity of spacing forming a distinctive characteristic of a good compositor. When he has filled his composing-stick, — in other words, has set up as many lines as his stick will hold, — he dexterously takes up the lines as if they were a piece of solid metal, and places them upon a ledged board, termed a *galley*. When in this manner he has composed a whole page, he secures the types by tying a cord round them. A sufficient number of pages having been composed to form a sheet, an impression from them, called a *first proof*, is taken and submitted to the inspection of a corrector, called a *reader*, whose duty is to detect and point out, by marginal references, all the errors that the compositor may have made. When these necessary alterations have been made, a second impression, called a *revise*, is taken. After undergoing the inspection of the reader, this revise is forwarded to the author, whose corrections being attended to, the pages are deemed fit for the press. Occasionally, however, to insure greater accuracy, additional revises are taken. Many attempts have been made during the last 20 years to supersede manual labor, in the composition of types; hitherto these attempts have been but partially successful. — *Distributing* is a part of the compositor's art for which he receives no direct pay. Before he can proceed with the setting up of the types, it is necessary that the compositor should have all the receptacles of his cases filled with types. This he effects as follows: Having washed free from dirt a quantity of type which has been already printed from, he takes up a number of the lines of types; these he rests upon the middle finger of his left hand, and steadies with his thumb; keeping the faces of the letters towards him, he takes up one or two words between the forefinger and thumb of his right hand, and drops the letters each into its proper receptacle, or "box." A good compositor will in this way "distribute," or return to their proper places, 50,000 letters a day. It should be stated that the pages, when prepared for printing, are secured, or "locked up," as the phrase is, in a rectangular frame of iron, called a "chase." The pages thus wedged up constitute what is called a *form*. Each side of a sheet has its own form, which may be carried about with as much ease as if it were composed of solid plates instead of being made up of forty, fifty, or even a hundred thousand separate and movable pieces. In this state the form is ready for — *Printing*. Originally, all impressions from types were taken by means of the hand-press, the inventor of which is unknown. The earliest form of it bore a very close likeness to the common screw-press, or the cheese or napkin-press, with the addition of a contrivance for running in the forms when inked under the pressure, and out again when the impression had been taken. The ink was formerly always laid upon large round pads or balls of leather, stuffed with wool. When these balls (Fig. 410), which were, perhaps, about 12 in. in diameter, had received a charge of ink, the apprentice dabbed the one against the other, working them with a twisting motion, and after having obtained a uniform distribution of the ink on their surfaces, with many dexterous flourishes, he applied them to the face of the types with both hands, until all the letters were completely and evenly charged. The operation was very troublesome, and much practice was required before the necessary skill was obtained, while it was always a most difficult matter to keep the balls in good working condition. The first important step towards the possibility of a printing machine was made, when for these inking balls was substituted a cylindrical roller, mounted on handles (Fig. 411). The body of the roller is of wood, but it is thickly coated with a composition which unites the qualities of elasticity, softness, and readiness to take up the ink and distribute it evenly over the types.

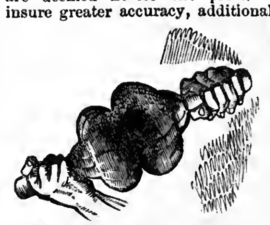

Fig. 410. — Inking Balls.

Fig. 411. — Inking Roller.

The materials used for this composition are chiefly glue and treacle, and sometimes also tar, isinglass, or other substances. Glycerine and various other materials have also been proposed as suitable ingredients for these composition rollers, but it is doubtful whether the original compound is not as efficacious as any yet tried. The composition is not unlike india-rubber in its appearance and some of its properties. The figure (411) represents equally the mode in which the roller is applied to the type in hand-presses, and that in which it is charged with ink, by being moved backwards and forwards over a smooth table upon which the ink has been spread. From the time of the first appearance of printing presses in Europe down to almost the beginning of the present century, a period of 350 years, no improvement in the construction appears to have been attempted. Earl Stanhope first, in 1798, made a press entirely of iron, and he provided it with an excellent combination of levers, so that the *platen* or flat-plate which overlies the paper and receives the pressure, is forced down with great power just when the paper comes in contact with the types. Such presses are capable of turning out about 250 impressions per hour, and it should be noted that the very finest book printing is still done by presses upon this principle. Stanhope's press was not of a kind to meet the desire for rapid production, to which the increasing importance of newspapers gave rise. The first practical success in this direction was achieved by König, who, in 1814, set up for the London "Times" two machines by which that newspaper was printed at the rate of 1,100 impressions per hour, the machinery being driven by steam power. Each of these machines printed only one side of the sheet, so that when they had been half-printed by one machine, they had

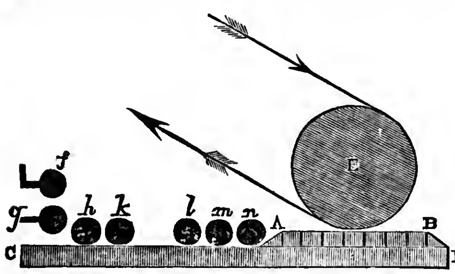

Fig. 412. — Diagram of Cowper and Applegath's Single Machine.

then to be passed through the other, in order to be "perfected," as it is technically termed. These machines were greatly improved by Applegath and Cowper, who contributed also a modification by which the sheets could be perfected in one and the same machine. As the principle of these machines has been followed, with more or less diversity of detail, in most of the *P.* machines at present in use, it is very desirable to lay that principle clearly before the reader. The diagram (Fig. 412) will make the action of Applegath and Cowper's single-*P.* machine easily understood. The type is set up on a flat form, A B, which occupies part of the horizontal table, C D, the rest of which, A C, is the inking table. E is a large cylinder, covered with woollen cloth, which forms the "blanket." The paper passes round this cylinder, and it is pressed against the form. The small black circles, *f*, *g*, *h*, *k*, *l*, *m*, *n*, represent the rollers for distributing the ink. *f* is called the *ductor* roller. This roller, which revolves slowly, is made of metal, and parallel to it is a plate of metal, having a perfectly straight edge, nearly, but not quite, touching the cylinder, and at the other side, as well as at the extremities, bent upwards, so as to form a kind of trough, to contain the ink, as a reservoir. The slow rotation of the ductor conveys the ink to the next roller, which is covered with composition, and being made to move backwards and forwards between the ductor roller and the table at certain intervals it is termed the *vibrating* roller. The ink having thus reached the inking-table, is spread evenly thereon by the *distributing* rollers, *h*, *k*, and it is taken up from the inking table, as the latter passes under, by the *inking* rollers, *l*, *m*, *n*. The table, C D, as a whole is constantly moving right and left

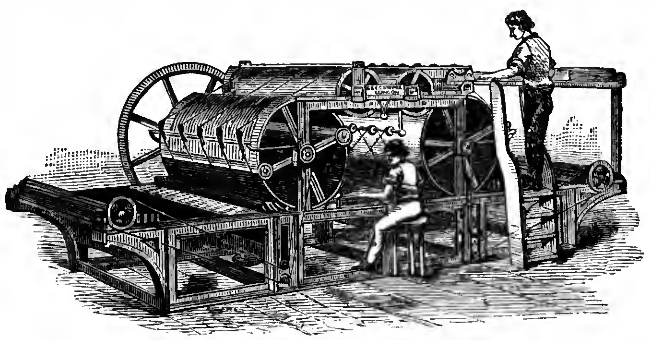

Fig. 414. — Cowper and Applegath's Double Cylinder Machine.

in a horizontal direction, so that the form passes alternately under the impression cylinder, E, and the inking rollers, *l*, *m*, *n*. The axles of the inking and distributing rollers are made long and slender, and instead of turning in fixed bearings, they rest in slots or notches, in order that, as the form passes below them, they may be raised, so that they rest on the inking slab, and on the types, only by their own weight. They are placed not quite at right angles to the direction of the table, but a little diagonally. The sliding motion caused by this helps very much in the uniform spreading of the ink. By these arrangements the form is evenly smeared with ink, since each inking roller passes over it *twice* before it returns to meet the paper under E. Fig. 413 is a similar diagram, to show the action of the double or perfecting *P.* machine, in which the sheets are printed on both sides. It will be observed that the general arrangement of impression cylinder, rollers, etc., is represented in duplicate, but reversed in direction. There are also two cylinders, B B, the purpose of which, as may be gathered from an inspection of the diagram, is to reverse the sheets of paper, so that after one side has been printed under the cylinder E, the blank surface may be turned downward, ready to receive the impression from the form, A B. Fig. 414 gives a view of the Cowper and Applegath double machine, as actually constructed. The man standing up is called the *feeder* or *layer-on*. He pushes the sheets forward, one by one, towards the tapes, which carry them down the farther side of the more distant cylinder, under which they pass, receiving the impression: and so on in the manner already indicated in the diagram (Fig. 413), until finally they reach a point where, released by the separation of the two sets of tapes, they are received by the *taker-off* (the boy who is represented seated on the stool), and are placed by him on a table. The bed or table which carries the form moves alternately right and left, impelled by a pinion acting in a rack beneath it, in such a manner that the direction of the table's motion is changed at the proper moment, while the driving pulley continues to revolve always in the same direction. The movements of the table and of the cylinders are performed in exact harmony with each other, for these pieces are so connected by trains of wheels and rackwork that the sheets of paper may always receive the impression in their proper position as regards the margins, and therefore, when the sheets are printed on both sides, the impressions will be exactly opposite to each other. This gives what is technically called "true register," and as this cannot be secured unless the paper travels over both cylinders at precisely the same rate, these are finished with great care by turning their surfaces in the latter to exactly the same diameter. — A number of improved machines of this general character were invented in Europe and America, and to them the world is indebted for cheap books, cheap newspapers, and cheap literature in general. But when, with railways and telegraphs, came the desire for the very latest intelligence, the necessities of the newspaper press, as regards rapidity of *P.*, soon required a greater speed than could possibly be attained by any of the flat form presses; for in these the table, with the forms placed upon it, is unavoidably of a considerable weight, and this heavy mass has to be set in motion, stopped, moved in the opposite direction, and again stopped during the *P.* of each sheet. The shocks and strains which the machine receives in these alternate reversals of the direction of the movement impose a

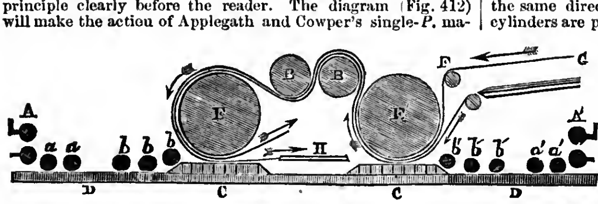

Fig. 413. — Diagram of Cowper and Applegath's Perfecting Machine.

limit beyond which the speed cannot be advantageously increased. The idea of placing the type on a rotating cylinder is due to Nicholson, who long ago proposed to give the types a wedge shape, so that the pieces of metal would, like the stones of an arch, exactly fit round the cylindrical surface. The wedge-shaped types were, however, so liable to be thrown from their places by the centrifugal force, that Nicholson proposed also certain mechanical methods of locking the types together after they had been placed on the circumference of the drum. The plan he suggested for this purpose involved, however, such an expenditure of time and trouble that his idea was never carried into practice. The first rotary machine, which was brought into practical use in 1847, was that by Richard M Hoe, of New York, which would print on one side from 15,000 to 20,000 sheets an hour. Applegath's rotary machine is not, therefore, as claimed by English writers, an original invention, but merely an improvement on Hoe's first machine. Applegath used type of the ordinary kind, which was set up on flat surfaces, forming the sides of a prism corresponding to the circumference of his revolving type cylinder, which was very large and placed vertically The flat surfaces which received the type were the width of the columns of the newspaper, and the type forms were firmly locked up by screwing down wedge-shaped rules between the columns at the angles of the polygon. These form the "column rules," which make the upright lines between the columns of the page, and by their shape they served to securely fix the type in its place. The diameter of the cylinder, to which the form was thus attached, was 5 feet 6 inches, but the type occupied only a portion of its circumference, the remainder serving as an inking-table. Round the great cylinder eight impression rollers were placed, and to each impression roller was a set of inking rollers. At each turn, therefore, of the great cylinder eight sheets received the impression. These cylinders were, as already stated, placed vertically, and, as it was necessary to supply the sheets from horizontal tables, an ingenious arrangement of tapes and rollers was contrived by which each sheet was first carried down from the table into a vertical position, with its plane directed towards the impression roller, in which position it was stopped for an instant, then moved horizontally forwards round the impression cylinder, and was finally brought out, suspended vertically, ready for a taker-off to place on his pile. This machine gave excellent results as to speed and regularity From 10,000 to 12,000 impressions could be worked off in an hour, and the advantage was claimed for it of keeping the type much cleaner, by reason of its vertical position. — The vertical machine, however, has been, to a great extent, superseded by others with horizontal cylinders, one of the fastest of which is the *Walter Press*, to which we must now direct the attention of the reader. But we must premise that such machines as the Walter Press became possible only by the discovery of the means of rapidly producing what is called a stereotype plate from a form of type. An account of the methods of effecting this is given under the headings, ELECTROTYPING and STEREOTYPING, but here it may suffice to say, that when a thick layer of moist cardboard, or rather a number of sheets of thin unsized paper pasted together and still quite moist, is forced down upon the form by powerful pressure, a sharp, even mould of the type is obtained, every projection in the latter producing a corresponding depression in the *papier maché* mould When the paper mould is dry, it may be used for forming a *cast* by pouring over it some fusible metallic alloy, having the properties of becoming liquid at a temperature which will not injure the mould, of taking the impressions sharply, and of being sufficiently hard to bear printing from. One of the improvements in connection with the Walter Press is in the mode of forming cylindrical stereotype casts from the paper mould. For this purpose the mould is placed on the *internal* surface of an iron semi-cylinder, with the face which has received the impression of the type inwards The central part of the semi-cylinder is occupied by a cylindrical iron core, which is adjusted so as to leave a uniform space between its convex surface and the concave face of the mould. Into this space is poured the melted metal, and its pressure forces the mould closely against the concave cylindrical surface to which it is applied, so that the thickness becomes quite uniform. The iron core has a number of grooves cut round it, and these produce in the cast so many ribs, or projections, which encircle the inner surface, and serve both to strengthen the cast and afford a ready means of obtaining an exact adjustment. Not the complete cylinder, but only half its circumference, is cast at once, the axis of the casting apparatus being placed horizontally, and the liquid metal poured in one unbroken stream between the core and the mould from a vessel as long as the cylinders. When the metal has solidified, the core is simply lifted off, and the cast is then taken out in the form of a semi-cylinder, the internal surface of which has exactly the diameter of the external surface of the roller of the machine on which it is to be placed, in company with another semi-cylindrical plate so that the two together encircle half the length of the roller; and when another pair of semi-cylinders have been fixed on the other part of the roller, the whole matter of one side of the newspaper sheet, usually four pages, is ready for *P.* One great advantage of working from stereotype casts made in this way is that the form-bearing cylinder of the machine has no greater circumference than suffices to afford space for the matter on one side of the paper. The casts are securely fixed on the revolving cylinder by elbows, which can be firmly screwed down. The casts are usually made to contain one page each, so that four semi-cylinders, each half the length of the revolving cylinder, are fixed on the circumference of the latter The process of casting in no way injures the paper mould, which is in fact

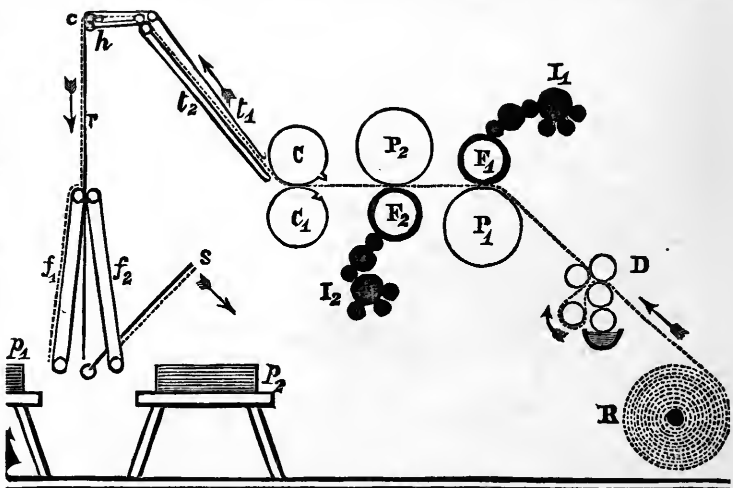

Fig. 415. — DIAGRAM OF THE WALTER PRESS.

generally employed to produce several plates. The Walter Machine is not fed with separate sheets of paper, but takes its supply from a huge roll, and itself cuts the paper into sheets after it has impressed it on both sides This is done by a very simple but effective plan, which consists in passing the paper between two equal-sized rollers, the circumference of which is precisely the length of the sheets to be cut. These rollers grip the paper, but only on the marginal spaces; and on the circumference of one of them, and parallel to its axis, is a slightly projecting steel blade, which fits into a corresponding recess, or groove, in the circumference of the other, and at this time the whole width of the sheet is firmly held by a projecting piece acted on by a spring. Although the Walter Machine, as actually constructed, presents to the uninitiated spectator an apparently endless and intricate series of parallel cylinders and rollers, yet it is in reality exceedingly simple in principle, as may be seen by the diagram given in Fig 415. In this we may first direct the reader's attention to the two cylinders, F_1, F_2, which bear the stereotype casts — one of the matter belonging to one side of the sheet, the other of the matter belonging to the other side, for the Walter Press is a perfecting machine — and the web of paper having been printed by F_1, against which it is pressed by the roller P_1, passes straight, as shown by the dotted line, to the second pair of cylinders, in order to be printed on the other side, and here, of course, the form cylinder, F_2, is below, and the impression cylinder, P_2, above, and an endless cleaning blanket is supplied to the latter to receive the *set-off*. The web of paper then passes between the cutting rollers, c, c_1, by which it is cut in sheets. But the knife has a narrow notch in the centre, and one at each end, so that the paper is not reversed at these parts, narrow strips or tags being left, which maintain for a while a slight connection. But the tapes, t_1 t_2, between which the paper is now carried, are

driven at a rather quicker rate than the web issues from $c\ c_1$; and the result is, that the tags are torn, and the sheet becomes separated from the portion next following it. Thus, as a separate sheet it arrives at the horizontal tapes, h, and is brought to another set of tapes mounted on the frame, e, racking about the centre, c, by which it is brought finally to the tapes, $f_1\ f_2$, which by the movement of e receive the sheets alternately. A sheet-flyer, s, oscillates between the tapes, $f_1 f_2$; and as fast as the sheets arrive, lays them down right and left alternately, and it only remains for the piles, p_1, p_2, so formed, to be removed. The inking apparatus of each form-cylinder is indicated by the series of rollers marked $1_1\ 1_2$; and in this part of the machine there are also some improvements over former presses, for the distributing rollers are not made of composition, but of iron, turned with great exactness to a true surface, and arranged so as not quite to touch each other. At D is an apparatus for damping the paper, in which there are hollow perforated cylinders, covered by blankets, and filled with some porous material, which is kept constantly wet. These cylinders being made to rotate rapidly, the centrifugal force causes the water to find its way uniformly to the outside. Here the paper also passes between rollers intended to flatten and to stretch it. At R is the great roll of paper, from which the machine takes its supply. These rolls contain, perhaps, five miles' length of paper, and at first it was a matter of some difficulty to fix them firmly on their wooden axles, so that they might be steadily unwound; but the contrivers of the Walter Press make these spindles as tight as may be required by forming them in wedge-shaped pieces, which can be made to increase the thickness of the spindle by drawing one upon another by screws. The great speed of the machine is secured by the paper being drawn by the machine itself from a continuous web, instead of being laid on in a separate sheet, so that the machine is not dependent on the dexterity of the layers-on, who are besides necessarily highly skilled workmen, and therefore a great economy of wages results from using a machine which does not require their services; and as the Walter Press also itself lays down the perfected sheets, the necessary attendants are as few as possible. — Another fast-printing machine is

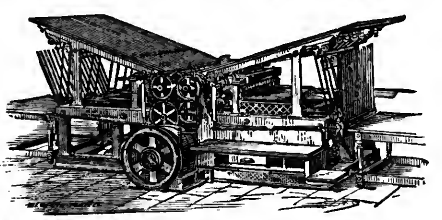

Fig. 416. — Hoe's Type-Revolving Cylinder Machine.

the *Type-Revolving Cylinder Machine*, invented by Richard H. Hoe, and manufactured by the well-known firm of Hoe & Co., of New York, with whose name the history of fast-printing machines must ever be associated. In these machines the type is placed on the circumference of a cylinder which rotates about a horizontal axis, and the difficulties of securely locking up the type are successfully overcome. The machines are made with 2, 4, 6, 8, or 10 impression cylinders, and at each revolution of the great cylinder the corresponding number of impressions are produced. In the two-cylinder machine, represented in Fig. 416, the form of type occupies about one fourth of the circumference of the great cylinder, the remainder being used as an ink-distributing surface. Round this main cylinder, and parallel to it, are placed smaller impression cylinders, from two to ten in number, according to the size of the machine. When the press is in operation, the rotation of the main cylinder carries the type form to each impression cylinder in succession, and it there impresses the paper, which is made to arrive at the right time to secure true register. One person is required for each impression cylinder, to supply the sheets of paper, which have merely to be laid in a certain position, when, at the proper moment, they are seized by the "grippers," or fingers of the machine, and after having been printed, are carried out by tapes and laid in heaps by self-acting sheet-flyers, by which the hands which are required to receive and pile the sheets in other machines are dispensed with. The ink is contained in a fountain placed beneath the main cylinder, and is conveyed by means of rollers to the distributing surface of the main cylinder. This surface, being lower than that of the type forms, passes by the impression cylinders without touching them. For each impression cylinder there are two inking rollers, receiving their supply of ink from the distributing surface of the main cylinder. These inking rollers, the bearings of which are by springs drawn toward the axis of the main cylinder, rise as the form passes under them, and having inked it, they again drop on to the distributing surface. Each page of the matter is locked up on a detachable segment of the large cylinder, which segment constitutes its bed and chase. The column-rules are parallel with the shaft of the cylinder, and are consequently straight, while the head, advertising, and dark rules have the form of segments of a circle. The column-rules are in the shape of a wedge with the thin end directed towards the axis of the cylinder, so as to bind the types securely. These wedge-shaped column-rules are held in their places by tongues projecting at intervals along their length, and sliding in grooves cut crosswise in the face of the bed. The space in the grooves between the column-rules are accurately fitted with sliding blocks of metal level with the surface of the bed, the ends of the blocks being cut away underneath, to receive a projection on the sides of the tongues of the column-rules. The locking up is effected by means of screws at the foot of each page, by which the type is held as securely as in the ordinary manner, upon a flat bed. The main cylinder of the machine represented in Fig. 416 has a diameter of 3 ft. 9 in., and its length is, according to the size of the sheets to be printed, from 4 ft. 5 in. to 7 ft. 4 in. The whole is about 20 ft. long, 10 ft. wide, including the platforms, and a height of 9 ft. in the room in which it is placed suffices for its convenient working. The steam power required is from one to two horse-power, according to the length of the main cylinder. The speed of these machines is limited only by the ability of the feeders to supply the sheets fast enough. The ten-cylinder machine has, of course, ten impression cylinders, instead of two, and there are ten feeding-tables, arranged one above the other, five on each side. The main cylinder has a diameter of 4 ft. 9 in., and is 6 ft. 8 in. long. The machine occupies altogether a space of 31 ft. by 16 ft., and its height is 18 ft. A steam engine of eight horse-power is sufficient to drive the ten-cylinder machine, which is then capable of producing 25,000 impressions per hour. The mechanism of the larger machines is precisely similar to that of the two-cylinder machine, except such additional devices as are necessary to carry the paper to and from the main cylinder at four, six, eight, or ten points of its circumference. Much admirable contrivance is displayed in the manner of disposing feeders as closely as possible round the central cylinder. In some machines, such as Hoe's, the sheet-flyers are interesting features, for they form an efficient contrivance for laying down and piling up, with the greatest regularity, sheet after sheet, as it issues from the press. The sheet-flyer is in fact an automatic taker-off, and therefore it supersedes the services of the boy who would otherwise be required. It is simply a light wooden framework of parallel bars, turning on one of its sides as a centre; and the tapes carrying the sheet, passing down between the bars, bring the paper down upon the frame, where its progress is then stopped, the frame makes a rapid turn on its centre, lays down a sheet, and quickly rises to receive another from the tapes. One can hardly see a printing machine in action without being struck with the deftness with which the sheet-flyer does its duty; for the precision with which it receives a sheet, lays it down, and then quickly returns, to be ready for the next, suggests to the mind of the spectator rather the movements of a conscious agent than the motions of an unintelligent piece of mechanism. The sheet-flyer is seen at the left-hand side where it is in the act of laying down a sheet on the pile it has already formed. — The modern improvements in printing presses are well illustrated by the machine represented in Fig. 417, which has been de-

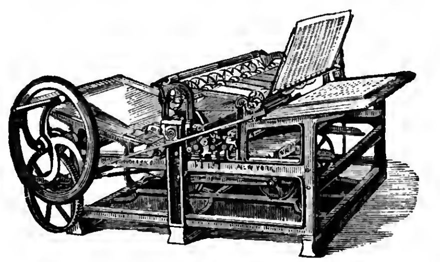

Fig. 417. — Hoe's "Railway" Printing Machine.

signed by Hoe & Co., to work exclusively by hand. It is intended for the newspaper and job work of a country office, and it works easily, without noise or jar, by turning the handle always in the same direction, producing 800 impressions in an hour. The bed moves backwards and forwards on wheels running on rails, the reciprocating movement being derived from the circular one by means of a crank. From the mode in which the table is carried backwards and forwards, the manufacturers call this the "Railway printing machine." The paper is fed to the under side of the cylinder, which, after an impression has been given, remains stationary while the bed is returning, and while the layer-on is adjusting his sheet of paper. The axle of the impression cylinder carries a toothed wheel working in a rack on the bed or table, the wheel having at two parts of its circumference the teeth planed off so as to permit of the return of the table without moving the impression cylinder, which is again thrown into gear with the rack by a catch, so that the same tooth of the rack always

enters the same space on the toothed wheel, and thus a good register is secured. The impression cylinder remains unaltered, whatever may be the size of the type form, it being only necessary to place the forward edge of the form always on the same line of the bed. Machines of a very similar construction, but driven by steam power, are used in lithographic printing (see LITHOGRAPHY); and in some of these machines advantage is elegantly taken of the fact that, when a wheel rolls along, the uppermost point of its circumference is always moving forward at exactly twice the velocity of its centre. Hence, if the table of a printing machine rests on the *circumference* of wheels, a backward and forward movement of the centres of these wheels, produced by the throw of a crank through a space of 2 ft., would produce a rectilineal reciprocating movement through a distance of 4 ft. of a table resting on the circumference of the wheels. Any reader who is interested in geometry or mechanics would do well to convince himself that the lowest point of the wheel of a railway carriage, for example, is stationary (considered while it is the lowest point), that the *centre* of the wheel is moving forwards with the velocity of the train, and that the highest point of the wheel is moving forwards with just twice the speed of the train. There is no difficulty about the rate of rectilineal motion of the centre, but the reader cannot possibly perceive the truth of the statement regarding the lowest and highest points unless he reflects on the subject, or puts it to the test of experiment.

In recent times a great number of printing processes have been devised, but only a few have found their way into practical use, and some of these have scarcely been so extensively applied as their merits appear to deserve: either because the public demand has been insufficient to bring these inventions into common use, or the cost of working them has been too great. There is no doubt of their scientific success, whatever may be their commercial value as competing with cheaper and readier methods. We shall first describe the plan which has been termed *Nature printing*. This process is applicable only to certain objects which possess, or may be made to assume, a flat form. It has been most successfully applied to botanical specimens, the impressions of the leaves, flowers, and other parts of plants being given with an accuracy and minuteness of detail which the finest work of an engraver could never attain. In fact, the prints may be examined with a microscope, and they then reveal the minute structure of the object with wonderful clearness and delicacy. Supposing the object to be printed is a plant or the frond of a fern, it is first thoroughly dried by being pressed between folds of blotting-paper by means of a screw-press. The paper is changed several times, and, when necessary, the drying is accelerated by a gentle heat. When the specimen is perfectly dry, it requires very careful handling, for it is then generally extremely brittle. It is laid upon a sheet of pure soft lead, the face of which has been formed into a perfectly even surface, smooth and bright as a mirror. A powerful pressure is then applied by passing the plate between a pair of polished steel rollers. The effect of this is to embed the plant in the soft metal, which thus receives even the most delicate markings of the object. The next operation is the careful and patient removal of the object from the plate; and as this is very brittle, it will be easily understood that it does not in general come away entirely, but portions will be left embedded in the metal. The skill of the operator is shown by destroying these by means of a blowpipe-flame, without in the least fusing the lead, which would of course ruin the impression. When the whole has been removed, the leaden plate will have been engraved, as it were, by the object itself; and in this state the plate will yield impressions with ink in the same manner as an engraved copper-plate. But in the soft metal the image would soon be obliterated, and therefore a fac-simile of its impression is obtained in copper by the electrotype process. For this end the lead is covered with a varnish, except on the face, and thus the deposit of copper takes place only where it is required, and the current of electricity is continued until a proper thickness of deposit has been obtained. This electrotype has all the hollow forms of the lead-plate in relief, and it is used only for the preparation of another electrotype. For this purpose its face is brushed over with fine, pure blacklead, in order to prevent the deposit from becoming incorporated with it, while the rest of the plate is varnished. When it is placed in the electrotyping solution the copper is deposited on the blackleaded face, and the action is continued until the layer of metal has acquired the thickness of one eighth of an inch. It is then removed from the matrix, and is ready for the printer, who deals with it in the ordinary manner of copper-plate printing, except that he uses a softer paper, and this is forced by the pressure into the depressions in the plate, so that the impression is really embossed on the paper. Colored inks are also used instead of black; for instance, to the leaves green-colored ink is applied, and to the stems, etc., brown ink.

Another process of wider interest, and producing very beautiful results, is known as the *Woodbury printing process*, from the name of its inventor. It is a mode of photographically forming a picture in relief, from which printing-blocks are obtained in much the same manner as in the nature-printing process. But the subject which is thus printed is a photograph; and it is only because in the actual production of the impression on paper the agency of light is not called into play that it is not described under the head of photography, for it is an ingenious mode of causing the photograph to engrave its own image on a metal-plate. It is founded on a fact which has already been noticed, namely, the insolubility of gelatine which has been mixed with a bichromate and exposed to the action of light. Mr. Woodbury has obtained the best results with a solution of Nelson's opaque gelatine, 1 oz. of which is dissolved in 5 oz. of water, and to each ounce of the solution 15 grains of ammonium bichromate are added. When a layer of this mixture, which is of course prepared in the dark, is exposed to the action of light under a negative photograph, the gelatine is rendered insoluble under those parts of the negative through which the light passes, that is, in the parts corresponding with the dark shades in the original object, and the depth of the layer thus rendered insoluble in each part will depend on the relative thickness of the silver deposit in the negative photograph. Thus, in the half-tints the insoluble layer will not be so deep as under the parts of the negative through which the light passes without interruption. But the differences of depth will appear when the soluble gelatine has been dissolved away on the side of the layer which is farther from the negative. Hence, Mr. Woodbury spreads his layer of bichromated gelatine on a sheet of plate-glass, previously coated with collodion, and when the gelatine has become dry, the double film is detached from the glass and exposed under a negative, the collodion side being uppermost and in contact with the photograph. After exposure the film is temporarily attached to another piece of glass, by means of a solution of india-rubber, and is then immersed in warm water, which quickly dissolves the soluble parts of the gelatine. Thus a counterpart in relief of the photograph is obtained. This is allowed to dry, and the next operation consists in obtaining an impression from it in metal. The dry hard gelatine is placed upon a flat, truly surfaced steel-plate, with the collodion surface downward, a plate of soft metal is placed upon the gelatine, and the whole is subjected to a pressure of about four tons per square inch in a hydraulic press. In one minute a perfect impression of the gelatine relief, down to the smallest detail, is formed in the soft metal; and, strangely enough, the delicate sculpture which the light has executed on the gelatine is not in the least injured, but will stamp its image on an indefinite number of metal plates in the same manner. The reader will understand that the impressed plate of metal now bears a hollow sculpture representing the image of the original object from which the negative photograph was taken, the darkest shades of the object being represented by the deepest depressions in the plate, while the highest lights are represented by portions of the metal at the level, or nearly so, of the surface of the plate. From this plate the prints on paper are obtained as follows: The plate is placed horizontally, with its impressed face upwards, and a quantity of a certain kind of ink is placed upon it. The composition of this ink, if ink it may be termed, is one of the ingenious parts of this elegant process. It is made of gelatine, colored with some suitable transparent or semi-transparent pigments, and it is poured on the plate in a warm and fluid state, and in quantity more than sufficient to fill all the hollows. A sheet of paper is placed over the plate, and a moderate pressure is applied, when the excess of ink is squeezed out and escapes. That which remains in the hollows of the plate, becoming set by cooling, adheres to and is removed with the paper, giving in each part a force of tint proportional to its quantity, that is, according to the depth of the hollow in the plate. The paper is laid aside to dry, and although the picture has at first a certain relief, yet the gelatine ink dries down, the picture becoming so flat that no difference of the surface is perceptible. It will be observed that this mode of printing rests upon a distinctly new principle — namely, the production of shades and gradations of tints by the varying quantity of the ink laid upon the different parts of the paper. The method is in this respect identical with that by which the water-color painter produces his gradations; for the color is applied in transparent layers, and the depth of the tint produced depends upon the mass of the pigment laid on, and is greater or less according as the white of the paper is more or less visible through the film of coloring matter. The gradations of tint in wood and steel engraving and in lithographs are dependent upon quite another principle — namely, the varying distribution of spots, patches, or lines in black ink of uniform intensity. The Woodbury print has all the detail and clearness of the photograph, together with a certain softness, produced by the transparency of the coloring matter, not found in the ordinary photographic print. The method admits of any desired tint being given to the prints, and these are perfectly unchangeable by light. Thus, the result is a print which secures every good quality of a photograph without any of the unpleasant ones, such as hardness, harsh tints, opacity, fugaciousness. The prints may be taken on plates of glass, and they then form beautiful transparencies. Such prints constitute most admirable slides for the magic lantern, since the semi-transparent coloring matter, and the soft gradations, produce charming effects.

Another ingenious invention provides a means of making the sunbeam *engrave a mezzotint copper-plate from a photograph*. The action of light on bichromated gelatine is here again taken advantage of. A film is prepared similar to that

used in the above-described Woodbury process proper, but the gelatine is mixed with some powdered or granular material, so that it may give rise to a granulated texture in the resulting plate. This film is treated exactly in the same way as before with regard to exposing, washing with warm water, drying, etc. The product is a very thin sheet, having a mezzotint-like surface, with more or less grain according to the action of the light. The white parts are perfectly freed from the granular matter by the solution of the gelatine, while in the darkest parts there is the greatest accumulation. The dry film in this condition is pressed into soft metal, and by a double process of electrotyping and subsequent facing with steel, a plate is obtained fit for printing at the copper-plate press. The firm of Messrs. Goupil & Co., of Paris, extensively employ this process for the preparation of the illustrations in that elegant publication, "The Portfolio." Another method of photographic engraving lately devised is the following: A plate of steel is covered with a layer of gelatine, mixed with a certain proportion of gum and glucose, and dried in a dark room. This is exposed to the action of light under a transparent photograph on glass. When afterwards this gelatine layer is breathed upon, the moisture attaches itself to the portions which have not been acted upon by the light, and these become more or less sticky. Sand or emery, sifted to three different degrees of fineness, is then sprinkled over the plate, beginning with the coarsest, which attaches itself to the most sticky parts. The less sticky parts are incapable of retaining these larger particles; while the finest sand, which is sprinkled on last, is held by parts of the plate that are even very slightly sticky; but the places where the light has been intense are dry, and none of the sand adheres. The gelatine layer is then completely dried, and the plate, being covered with another of soft metal, is placed in a press, by which a granular impression is produced on the soft metal, and this may then be copied in copper by the electrotype process. The larger particles of sand produce deeper depressions in the plate, and thus a gradation of tint is obtained. See CALICO-PRINTING, COLOR-PRINTING, LITHOGRAPHY, PAPER-HANGING, PHOTOLITHOGRAPHY, Etc.

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18	19	16	144	288	432	648	
19	20	18	152	304	456	684	
20	22		160	320	480	720	
21	23	2	168	336	504	756	
22	24	4	176	352	528	792	
23	25	6	184	368	552	828	
24	26	8	192	384	576	864	
25	27	10	200	400	600	900	
26	28	12	208	416	624	936	
27	29	14	216	432	648	972	
28	30	16	224	448	672	1008	
29	31	18	232	464	696	1044	
30	33		240	480	720		
31	34	2	248	496	744		
32	35	4	256	512	768		
33	36	6	264	528	792		
34	37	8	272	544	816		
35	38	10	280	560	840		
36	39	12	288	576	864		
37	40	14	296	592	888		
38	41	16	304	608	912		
39	42	18	312	624	936		
40	44		320	640	960		
41	45	2	328	656	984		
42	46	4	336	672	1008		
43	47	6	344	688			
44	48	8	352	704			
45	49	10	360	720			
46	50	12	368	736			
47	51	14	876	752			
48	52	16	384	768			
49	53	18	392	784			
50	55		400	800			

Printing-Press. See PRINTING.

Printing-Type. See PRINTING.

Print-Store, PRINT-SHOP, a store where engravings are kept on sale.

Print-Works, a factory where machinery block printing is carried on. — A place for printing calicoes.

Privateer, an armed ship fitted out by private individuals, to annoy and plunder the public enemy. But before commencing their operations, it is indispensable that they obtain *letters of marque and reprisal* from the government whose subjects they are, authorizing them to commit hostilities, and that they conform strictly to the rules laid down for the regulation of their conduct. All private individuals attacking others at sea, unless empowered by letters of marque, are to be considered pirates; and may be treated as such, either by those they attack, or by their own government. The practice of privateering is contrary to the rights and interests of humanity. It seems to be a remnant of that species of private war which is exercised by all individuals in early ages, but which gradually disappears as society advances. And though by injuring individuals, it aggravates the suffering inseparable from national struggles, it has little or no tendency to accelerate their termination. *P.* rarely attack ships of war. Their object is merely to plunder and destroy merchantmen. And experience has shown that it is not possible, whatever precautions may be adopted, to prevent them from attacking neutrals and perpetrating all sorts of abuses. The wish to amass plunder is the only principle by which they are actuated; and such being the case, it would be idle to suppose that they should be very scrupulous about abstaining from excesses. A system of this sort, if it be ever useful, can be so only to nations that have little trade, and that may expect to enrich themselves during war by fitting out *P.* to plunder the merchant ships of their enemies. In all other cases it seems to be productive only of mischief; though it is, of course, most injurious to those States that have the greatest mercantile navy. By declaration signed in Paris, 1856, by the plenipotentiaries of the great Powers of Europe, and to which most of the surrounding States of Europe and America gave their adhesion, privateering was abolished between the States adhering to the stipulations of that declaration. Our Government refused to subscribe to the declaration unless it be added to it, "that the private property of the subject or citizen of a belligerent on the high seas should be exempted from seizure by public armed vessels of the other belligerent, except it be contraband of war." This amendment having been declined, the matter was left in abeyance until 1861, when the U. States Government offered to adhere unconditionally to the terms of the declaration, which offer was again declined by England and France, unless it be understood that it would not apply to the Confederate States, where letters of marque had been just issued to *P.* Our old laws on the subject are, therefore, still in force, and it is not possible to say what might be their effect were a quarrel to occur.

Prize, a capture made in time of war. — A scholarship medal, money premium, or other reward gained by competition. — Money drawn by a lottery-ticket.

Maritime law. The right to all captures vests primarily in the government, and no individual can have any interest in a *P.*, whether made by a public or private armed vessel, but what he receives under the grant of the State. This is a

general principle of public jurisprudence, and the distribution of the proceeds of *P.* depends upon the regulations of each State; and unless the local laws have otherwise provided, the *P.* vest in the government. But the general practice, under the laws and ordinances of the belligerent governments, is to distribute the proceeds of captured property, when duly passed upon and condemned as *P.*, among the captors, as a reward for bravery, and a stimulus to exertion. When a *P.* is taken at sea, it must be brought with due care into some convenient port, for adjudication by a competent court. A judicial inquiry must pass upon the case, and the present enlightened practice of commercial nations has subjected all such captures to the scrutiny of judicial tribunals, as the only sure way to furnish due proof that the seizure was lawful. The property is not changed in favor of neutral vendee or recaptor, so as to bar the original owner, until a regular sentence of condemnation has been pronounced by some court of competent jurisdiction belonging to the government of the captor; and the purchaser must be able to show documentary evidence of that fact to support his title. Until the capture becomes invested with the character of *P.* by a sentence of condemnation, the right of property is in abeyance, or in a state of legal sequestration. It cannot be alienated or disposed of, but the possession of it by the government of the captor is a trust for the benefit of those who may be ultimately entitled. This salutary rule, and one so necessary to check irregular conduct and individual outrage, has been long established in the English admiralty, and it is now everywhere recognized as the law and practice of nations. The condemnation must be pronounced by a *P.* court of the government of the captor, sitting either in the country of the captor or of his ally. The *P.* court of an ally cannot condemn. *P.* or no *P.*, is a question belonging exclusively to the courts of the country of the captor. The reason of this rule is said to be, that the government of the captors has a right to inspect their behavior, for he is answerable to other States for the acts of the captor. The *P.* court of the captor may sit in the territory of the ally, but it is not lawful for such a court to act in a neutral territory. Neutral ports are not intended to be auxiliary to the operations of the power of war; and the law of nations has clearly ordained that a *P.* court of a belligerent captor cannot exercise jurisdiction in a neutral country. This prohibition rests not merely on the unfitness and danger of making neutral ports the theatre of hostile proceedings, but it stands on the ground of the usage of nations. It was for some time supposed that a *P.* court, though sitting in the country of its own government, or of his ally, had no jurisdiction over *P.* lying in a neutral port, because the court wanted that possession which was deemed essential to the exercise of a jurisdiction in a proceeding *in rem.* The principle was admitted to be correct by Sir William Scott, in the case of the *Henrick* and *Maria*, and he acted upon it in a prior case. But he considered that the English admiralty had gone too far in supporting condemnations in England, of *P.* abroad in a neutral port, to permit him to recall the vicious practice of the court to the acknowledged principle; and the English rule is now definitively settled, agreeably to the old usage and the practice of other nations. The Supreme Court of the U. States has followed the English rule, and it has held valid the condemnations, by a belligerent court, of *P.* carried into a neutral port, and remaining there. This was deemed the most convenient practice for neutrals, as well as for the parties at war; and though the *P.* was, in fact, within a neutral jurisdiction, it was still to be deemed under the control of the captor.

Prize-Money, a share or division of prizes captured, the proportion being regulated according to the rank of the recipient.

Probang, a long, slender rod of whalebone, with a piece of sponge at its extremity, intended to push down extraneous bodies, arrested in the œsophagus, into the stomach.

Probe, a surgical instrument, generally made of silver wire, rounded at one end and pointed at the other, used for the purpose of examining wounds.

Proceeds, the sum afforded by a sale, the product.

Procès Verbal [Fr.], a written declaration; a statement made before a magistrate; the minutes or written transactions of a society or association.

Procuration, authority or power to act for another. In mercantile affairs, a foreign agent or correspondent is often authorized to sign for a firm, or to pledge its credit and authority; which is called *P.*

Produce, a general trade name for the staple products of the farm. — The yield of grain or other crop per acre. — In mining, the percentage of metal in the ore.

Produce-Broker, one whose occupation it is to buy and sell agricultural or farm products.

Profession, a trade or calling; usually, however, restricted and taken to designate those who are not traders, but skilled and learned men, as lawyers, medical men, and the clergy.

Professional, a term applied to a singer, musician, or actor.

Professor, a public teacher of any science or art.

Profile, an outline or contour; a side face or half face.

Profit, the net gain upon mercantile transactions.

Profit and Loss Account. See BOOK-KEEPING.

Pro-forma Account, a model or sketch account; a pattern bill of particulars.

Prog, a slang sea term for provisions.

Programme, a detail or outline guide of anything to be done, as of a theatrical performance, musical entertainment, public procession or festivity, etc.

Projectile, a body, such as a rocket, ball, or shell, impelled through the air.

Prologue, a preface in verse before a play.

Promethean, a lucifer match.

Promissory Note, a promise, in writing, made by one person to pay another, absolutely and unconditionally, a certain sum of money at a time specified. It is rarely made payable only to the person named therein, but also to order or bearer, by which it becomes negotiable. The person who grants the note is called the *maker;* the person to whom it is payable, the *payee*, who becomes the *indorser*, when he negotiates it by *indorsement;* and the person to whom it is transferred is the *indorsee.* — It seems scarcely necessary to point out the distinction between bills of exchange and *P. N.* in their general structure and character. In a bill of exchange there are ordinarily three original parties, the drawer, the payee, and the drawee, who, after acceptance, becomes the acceptor. In a *P. N.* there are but two original parties, the maker and the payee. In a bill of exchange, the acceptor is the primary debtor in the contemplation of law to the payee; and the drawer is but collaterally

liable. In a *P. N.*, the maker is, in contemplation of law, the primary debtor. If a note be negotiable, and is indorsed by the payee, then there occurs a striking resemblance in the relations of the parties upon both instruments, although they are not in all respects identical. The indorser of a note stands in the same relation to the subsequent parties as the drawer of a bill, and the maker of the note is under the same liabilities as the acceptor of a bill.

Prompt, a trade term for a limit of time given for payment of the account for goods purchased; the limit varying with different goods.

Prompter, a person stationed near the actors in a theatre, who reminds them of their parts and duties when forgetful.

Prompt-Note, a note of reminder of the day of payment and sum due, etc., given to a purchaser at a sale of goods.

Prong, the spike of a fork.

Proof, PROOF-SHEET, an impression taken from the type, for the purpose of correction before the final printing. — A first impression of an engraving. — A test or trial.

Proof-Spirit See ALCOHOL.

Prop, a support or pole for any purpose, as supporting a clothes-rope, etc

Propagating-Glasses, small hand-glasses to cover young seedlings or growing plants, cucumbers, etc., in a garden or nursery-ground.

Propeller, an arrangement by which motion is given to a carriage bearing a portion of the working gear required to traverse regularly in a horizontal direction. The term is, however, more generally applied to a peculiar mechanism set in motion by some mechanical power in vessels or ships, which causes them to advance by the resistance of the water itself. See OAR, PADDLE-WHEEL, SAIL, SCREW-PROPELLER, etc

Property Man, one having charge of the loose articles of furniture, table-fittings, etc., in a theatre, which are technically termed "*properties.*"

Proprietor, an owner or possessor of property. — A holder of stock or shares in a public company.

Pro Rata, an equitable division or fair proportional distribution of profit and loss.

Proscenium, the front of the stage; before the scenes.

Prospecting, a miner's term for searching or examining for gold, preliminarily to settled or continuous operations.

Prospectus, in commercial parlance, the preliminary announcement, first details, or outline sketch of constitution, intended plans and operations of a new company, or a joint-stock association.

Prote, the foreman in a French printing office.

Protection, the protecting or bolstering up of certain branches of domestic industry by prohibiting the importation of the products of such branches from abroad, or loading it, when imported, with heavy duties. See PROTECTION AND FREE TRADE, in the Appendix.

Protest, in the *law on bills of exchange*, a formal statement made in writing by a public notary, under seal, that a bill or note was, on a certain day, presented for acceptance or payment, and that such acceptance or payment was refused, thereby making a claim against the parties for the loss or damage which may arise to the holder. *P.* for non-acceptance or non-payment, when duly made and accompanied by notice to all the parties to the bill or note, has the effect of making all of them responsible to the holder for the amount of the bill or note, together with damages, etc. See NOTICE. — In *maritime law*, a writing, attested by a justice of the peace, a notary public, or consul, made and verified by the master of a vessel, stating the severity of a voyage by which a ship has suffered, and showing that it was not owing to the neglect or misconduct of the master. — The *P.* is not, in general, evidence for the master of the vessel or his owners in the English or American courts; yet it is often proper evidence against them.

Protractor, a thin brass, ivory, or wooden instrument for laying down and measuring angles on paper with accuracy and despatch, and by which the use of the line of chords is superseded. It is of various forms, semi-circular, rectangular, and circular.

Proved, fully tried or tested; as metals for strength. Gunpowder, fire-arms, pieces of ordnance, anchors, chain-cables, iron girders, or pillars, etc., are always proved, to test their efficiency or strength. A will which has been published or registered in the proper court is also said to be proved.

Provedore, PROVIDORE, a purveyor or steward; one who supplies provisions in large steamers, etc.

Provence-Oil, an esteemed variety of olive-oil, the produce of Aix, in France.

Provence Rose, a variety of rose, esteemed for its beauty and fragrance, of which there are several varieties.

Provender, hay, chopped straw, or other dry food for cattle.

Providence. See RHODE ISLAND.

Providence and Worcester R. R. runs from Providence, R. I., to Worcester, Mass., 43.41 m , branches, 8 m.; leased lines, 15.33 m.; total length of line operated, 66.74 m. This Co., located in Providence, was chartered in 1844, and the road was completed in 1847. Cap. stock, $2,000,000; funded debt, $1,176,000; floating debt, $629,130. Cost of construction and equipment, $3,719,521.

Providence Washington, a fire and marine insurance Co., located in Providence, R. I., and organized in 1799. *Statement*, Jan. 1, 1880 Cap. stock paid up, $400,000; net surplus, $73,127 Risks in force (fire), $1,535,673; premiums, $58,-462.

Proving-Press, an apparatus for testing the strength of iron girders, and other castings, by pressure.

Provisional, holding office or place temporarily.

Provision, the property which a drawer of a bill of exchange places in the hands of a drawee; as, for example, by remittances, or when the drawer is indebted to the drawee when the bill becomes due, *provision* is said to have been made.

Provision-Dealer, a grocer, a retailer of hams, bacon, butter, cheese, and such articles.

Provision-Merchant, a general dealer in articles of food.

Provisions. Under this term, taken in its most extensive sense, in reference to man, may be comprised all those articles used as food by the inhabitants of this and other countries; but commercially it is understood to comprise only fresh and salted butchers' meat, hams and bacon, butter and cheese, eggs, and a few other articles.

Proviso, a conditional clause in any legal document, on the observance of which the validity thereof depends.

Proxy, a deputy; a stamped power of attorney, or authority to vote or act for another.

Prunelet, a liquor made from sloes or wild plums.

Prunella Salt, SAL PRUNELL, fused nitre or saltpetre, moulded into cakes or balls, and used for chemical purposes.

Prunello, a thin woollen or mixed stuff, formerly used for clergymen's gowns, but now chiefly employed for covering shoes worn by elderly females.

Prunes, PRUNELLOES, dried plums, which are extensively imported from France as a table fruit, for pies and puddings, also for medicinal uses, their properties being laxative when stewed. The largest and finest kind, the French plum, or table prune, is the Catherine variety of the *Prunus domestica*, and is usually packed in cartoons; the common kind, the Julian variety, being packed in barrels. *Imp.* duty, 1 cent per lb.

Pruning-Tools are knives and shears of varied forms, for lopping off the superfluous branches of trees and shrubs.

Prussia, an extensive kingdom of Germany, comprising the larger portion of the empire, situated between lat. 49° 7′ and 55° 52′ N., lon. 5° 50′ and 22° 50′ E.; bounded N. by the Baltic and Denmark, E. by Russia, S. by Austria, the kingdom of Saxony, the Thuringian States, Bavaria, Hesse, and Alsace-Lorraine, W. by Luxemburg, Belgium, and Holland. *P.* is administratively divided into 11 provinces, which again are subdivided into 35 government districts (*Regierungsbezirke*), with the principality of Hohenzollern, cradle of the royal family. The following table gives the area and pop. according to the census of Dec. 1, 1875: —

Provinces.	Area sq. miles.	Population.
Prussia (Preussen)	24,880	3,199,171
Brandenburg	15,505	3,126,411
Pomerania (Pommern)	12,130	1,462,290
Posen	11,330	1,606,084
Silesia (Schlesien)	15,666	3,843,699
Saxony (Sachsen)	9,729	2,168,988
Schleswig-Holstein	8,524	1,073,926
Hanover (Hannover)	14,846	2,017,393
Westphalia (Westfalen)	7,771	1,905,697
Hesse-Nassau	5,943	1,467,898
Rhine (Rheinland)	10,289	3,804,381
Principality of Hohenzollern	453	66,466
Total	137,066	25,742,404

The census of 1875 gives the average density of the pop. at 188 per English sq. m. The variation, however, is considerable, the density being highest in the manufacturing districts of Düsseldorf, in the Rhine province, where it is nearly four times the average, and smallest in the district of Köslin, Pomerania, where it amounts but to three fifths of the average. There are a great number of towns, — 1,289 officially enrolled as "Städte," — most of them of very limited pop., spread all over the kingdom. The 10 largest cities are Berlin (see below), Breslau (pop. 239,050), Cologne or Köln (135,371), Magdeburg (122,789), Königsberg (122,636), Hanover (106,677), Frankfort-on-Maine (103,136), Dantzic (97,931), Barmen (86,504), and Stettin (80,972). The present constitution of *P.* vests the executive and part of the legislative authority in a king, who attains his majority upon accomplishing his 18th year. The crown is hereditary in the male line, according to primogeniture. In the exercise of the government, the king is assisted by a council of ministers, appointed by royal decree. The legislative authority the king shares with a representative assembly, composed of two Chambers, the first called the *Herrenhaus*, or House of Lords, and the second the *Abgeordnetenhaus*, or Chamber of Deputies. The assent of the king and both Chambers is requisite for all laws. Financial projects and estimates must first be submitted to the second Chamber, and be either accepted or rejected *en bloc* by the Upper House. The right of proposing laws is vested in the government and in each of the Chambers.

The surface of *P.* is generally flat. With the exception, indeed, of part of the *Harzgebirge* (or Hartz Mountains), in the prov. of Saxony, the *Teutoburgerwald*, and some other ranges in Westphalia and Saxony, the volcanic district in it and the Lower Rhine, and the *Riesengebirge* (Giants' Mountains), on the S.W. confines of Silesia, there is no other tract that is more than hilly. *P.* is, in fact, a country of vast plains, and in most parts so very level, that many marshes and small lakes have been formed by the inundations of the rivers. The E. or principal division of the monarchy slopes imperceptibly from the S. frontier towards the Baltic, the shores of which are low and sandy. — *Soil.* The quality of the soil is very various. In Brandenburg and Pomerania it is generally poor; in many parts, indeed, it consists of tracts of loose barren sand, diversified with extensive heaths and moors; but, in other parts, particularly along the rivers and lakes, there is a good deal of meadow, marsh, and other comparatively rich land. In E. *P.* and Prussian Poland, including the prov. of Posen, the soil consists generally of black earth and sand, and is, in many parts, very superior. But Silesia, and the Saxon and Rhenish provs. are, naturally, perhaps the most productive. The plain of Magdeburg, on the left bank of the Elbe, is the most fertile and best cultivated district of the kingdom. *P.* possesses a large number of navigable rivers intersecting the country, — viz., the Niemen, Pregel, Vistula, Oder, Elbe, Weser, and Rhine. The coasts of the Baltic and North Seas form a number of gulfs and bays. The forests are extensive, occupying an area of nearly 10,000,000 acres, chiefly consisting of fir. The mineral riches of *P.* are very considerable. The following table shows the number of miues in operation, the quantities and value of their products in the year 1878, and the number of persons employed therein at the end of the same year: —

Principal Mines.	Mines in operation.	Quantities of produce.	Value of produce.	Persons employed.
		Centner.	Mark.	
Coal	448	689,324,980	226,582,224	158,902
Lignite (Braunkohle)	553	179,702,447	31,499,710	19,322
Iron ore	737	51,445,009	17,346,737	20,149
Zinc ore	70	10,626,295	12,949,215	11,579
Lead ore	141	2,256,881	20,103,912	31,897
Copper ore	21	6,005,574	6,944,922	13,857
Total	1,970	939,361,186	315,426,720	255,706

The following table shows the number of smelting works and foundries in *P.*, the quantities and value of their produce in 1878, and number of persons employed at the end of the same year: —

Principal Smelting works and foundries.	Works in operation.	Quantities of produce.	Value of produce.	Persons employed
		Centner.	Thaler.	
Iron, wrought	160	25,605,370	38,335,297	19,001
" cast	785	28,445,374	94,542,026	68,988
Steel	54	7,435,704	30,823,558	22,997
Lead	17	1,306,007	9,054,375	2,572
Silver	2	2,269	6,499,544	335
Arsenic	1	4,290	21,537	6
Vitriol	1	74,959	352,715	40
Zinc	32	1,403,589	9,511,589	5,845
Copper	8	125,032	3,604,878	1,358
Nickel	3	3,672	433,131	99
Sulphuric acid	10	835,135	1,059,990	267
Total	1,073	65,241,401	194,238,640	121,508

Not included in the above statement are 35 salines, which produced 4,553,359 centner of salt, of the value of 6,125,049 mark, and employed 2,199 persons in 1878. The production of coal has vastly and steadily increased from 3,000,000 tons in 1840, to 13,000,000 in 1860, 30,000,000 in 1870, and 43,364,968 in 1878. The coal pits in the Ruhr-Düsseldorf district, which extend over more than 10 m. in length, and are calculated to be able to continue their present supply for 5,000 years, contribute nearly one half of the total product, while the coal pits of the river Saar, situated in the S.W. angle of the Rhenish prov., and which extend their strata into Bavarian and French territory, furnish about the sixth part of the coal

produced in *P.* The coal raised in *P.* amounts to 93 per cent of the total coal production of Germany. — Agriculture and the rearing of cattle constitute the principal sources of employment and wealth of the rural pop. of the entire monarchy. Wheat, rye, oats, barley, pease, millet, rape-seed, maize, linseed, flax, hemp, tobacco, hops, etc., are extensively cultivated and largely exported. The western division is noted for its excellent fruits and vegetables, and the Rhenish prov. stand pre-eminent for their wines. *P.* has upwards of 100 mineral springs, possessing various properties and qualities. Its manufactures consist chiefly of linens, for which Silesia, Saxony, and Westphalia have long been noted. The cotton works are extensive. Beside these, there are numerous manufactories of silk, woollen, mixed cotton and linen fabrics, including shawls, carpets, etc.; woollens are made in almost every

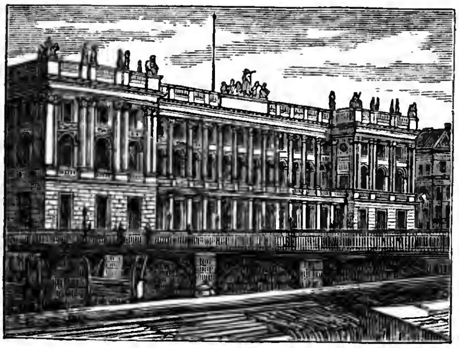

Fig. 418. — The Exchange (Berlin).

town and large village. Next in importance are leather, earthenware, glass, paper, and tobacco manufactures, and working in metals. Brewing is a business of great importance. The principal imports comprise coffee, tea, sugar, cotton, and other produce of the colonies; wines, silk, fruit, manufactured goods, tin, furs, dye-stuffs. The principal exports comprise linens, woollens, hardware, corn, wool, timber, pitch, linseed, tobacco, mineral waters; to which may be added horses, horned cattle, hams, salt meat, etc.; and from the Rhenish prov., wine. — The direct trade of *P.* with foreign countries is carried on mainly through the ports on the Baltic, and the amount of exports and imports shipped through harbors on the North Sea is comparatively unimportant. A very large portion of exports from, and imports into, the kingdom pass in transit through Hamburg and Bremen. The commercial intercourse of *P.* with the U. States is included in that of Germany (see pages 440 and 441). Under the heading Germany are also given the Prussian seaports (see pages 442–444).

Finances. In recent years in *P.* the public revenue and expenditure have been about evenly balanced, without surplus or deficit. For the year 1879, the public revenue amounted to 713,857,764 mark ($178,464,445). Direct taxes form the chief source of revenue, and, next to it, the receipts from State railways. In recent years, the income from railways and other State undertakings, such as mines, has been largely increasing, showing a tendency to become a far more fruitful source of revenue than all taxation, direct or indirect. The expenditure for the army and navy is not entered into the budget of *P.*, but forms part of the budget of the empire. — The public debt of the kingdom, inclusive of the provinces annexed in 1866, was, according to an official report laid before the House of Deputies, as follows, on March 31, 1878: —

1.	National debt bearing interest: —	Mark.
	Consolidated debt of May 2, 1842 (Staatsschuldscheine)	134,964,300
	Consolidated debt of June 11, 1873, and June 7, 1876	150,000,000
	Debt of provinces annexed in 1866	93,107,143
	Non-consolidated loans of 1850, 1852, 1853, 1862, and 1868	108,357,000
	War debt of the Kurmark and Neumark	2,588,745
	Preference loan of 1855	25,590,000
	Consolidated loan of 1870	503,938,150
	State railway debt	45,776,941
	Total national debt bearing interest	1,067,322,279
		$266,830,570
2	National debt not bearing interest: —	Mark.
	Floating debt, called "Schatz-Anweisungen"	30,000,000
	Total national debt	1,097,322,279
		$276,330,570

P. has a very large and complete system of railways. In 1878 their length of lines was as follows: —

A. Lines open for traffic: —	
1. Owned by the State	3,871
2. Owned by private companies: —	
Under State administration	2,430
Under private administration	8,255
B. Lines in progress of construction: —	
1. Owned by the State	253
2. Owned by private companies: —	
Under State administration	313
Under private administration	1,432
Total (in kilomètres)	16,554
English miles	10,346

All the lines of the former territories of Hanover, Hesse, and Nassau are owned by the State, and at a period not far removed the whole of the railways of *P.* will be national property.

Berlin, the metropolis of the German Empire, the capital of the kingdom of *P.*, and the chief city of the prov. of Brandenburg, is situated in lat. 52° 30′ 16″ N., lon. 13° 23′ 16″ E., on both sides of the river Spree, not far from its junction with the Havel, one of the principal tributaries of the Elbe. At the accession of Frederick William IV., in 1840, Berlin had a pop. of 331,894, and in 1879, forty years later, the pop. had more than trebled, the exact number in that year being 1,018,818. During this short space of time, Berlin, formerly celebrated chiefly for its institutions for the promotion of learning, science, and the arts, has grown in splendor as it has increased in numbers. This city is now not only a centre of intelligence, but also a very important centre of manufacture and commerce. Its trade and manufactures appear to be at present in a transition state, — old branches are dying out, and new branches are springing into existence. Direct railway communication between the corn lands of N. E. Germany, Poland, and Russia on the one hand, and the States of Central and W. Germany on the other, has deprived Berlin of much of its importance as a centre of trade in corn and flour. In like manner the spirit trade and manufactures have suffered. The 20,892,493 litres exported in 1870 had sunk to 9,737,597 litres in 1872. On the other hand, for petroleum, Berlin has become an emporium for the supply of the Mark of Brandenburg, part of Posen, Silesia, Saxony, and Bohemia. Silk and cotton manufacture, which in former times constituted a principal branch of Berlin manufacture, has died out. As late as 1849 Berlin had 2,147 silk looms; now it has few or none. Woollen manufacture maintained its ground for a time, occupying about 8,000 looms and 11,404 workmen as late as 1861. In 1874 the number of hands employed in spinning and weaving in all branches had sunk to 2,918. The chief articles of manufacture and commerce are locomotives and machinery; carriages; copper, brass, and bronze wares; porcelain; and the requisites for building of every description. The manufacture of sewing-machines has assumed large proportions, from 70,000 to 75,000 being manufactured annually. According to the report of the government inspector of factories for the city of Berlin, presented to the minister of trade and commerce, the number of persons employed in all the Berlin factories in the year 1874 was 64,466. By a "factory" was understood any wholesale manufacturing establishment employing more than 10 persons. There were 1,906 such factories at work, employing 51,464 males and 11,004 females above 16 years of age; 1,137 males and 760 females under 16 and above 14 years of age; and 66 male and 14 female children under 14 years of age. The manufacture of steam-engines and machinery occupied 14,737 persons; brass-founding, metallic-belt, and lamp manufacture, 9,074; carpentry, joinery, and wood-carving, 4,548; printing, 3,620; spinning and weaving, 2,918; sewing-machines and telegraphic apparatus, 2,788; the finer qualities of paper, 2,585; porcelain and ware, 1,741; dyeing, 1,712; gas-works, 1,518; tobacco and cigars, 1,477; manufacture of linen garments, 1,355; pianos and harmoniums, 1,198; dress-making and artificial flowers, 1,127; brewing, 1,061. None of the other branches found occupation for 1,000 persons. The value of the annual exports to the U. States of articles of Berlin manufacture has risen to about $5,000,000. The exports to Brazil, the Argentine Republic, and Japan are also increasing. Berlin is growing in importance as a money market and centre of industrial undertakings. The Berlin Cassenverein, through which the banking houses transact their business, passed $6,759,944,835 through its books in 1872, as compared with $3,222,156,125 in 1871. In 1872, 23 new banking establishments were enrolled in the trade register with a capital of $37,825,000; and in the same year 144 new joint-stock companies were enrolled, representing a capital of $90,000,000. Since that time the tide of enterprise has ebbed, but the majority of these undertakings continue to exist.

Prussian Blue, a well-known fugitive color, used in dyeing, for tinting paper, and by washerwomen. It is obtained by mixing a solution of sulphate of iron and yellow prussiate of potash. See Dyeing. *Imp.* duty, dry or moist, 30 per cent.

Prussian Brown, a color obtained by adding a solution of the yellow prussiate of potash to a solution of sulphate of copper, which throws down a precipitate of deep brown; this, when washed and dried, is equal to madder, and possesses a greater permanency.

Prussiate of Potash, a chemical substance consisting of cyanogen united to iron and potassium, with animal refuse added to supply nitrogen. This salt is remarkable for the beauty of its crystals, and the brilliant colors of many of its compounds.

Prussic Acid, a name for hydrocyanic acid, one of the most powerful of poisons.

Psyché [Fr.], a cheval dressing-glass.

P. S., an abbreviation for *postscriptum*, the postscript of a letter. — Also a theatrical abbreviation for the "prompter's side" of the stage.

Publican, in England, an ale-house keeper.

Publication, the act of publishing or printing anything for diffusion.

Publicist, a writer on international law, etc.

Publish, to print and offer for sale.

Publisher, one who prints books, and supplies the public and the trade with copies.

Pucheux, a copper ladle used in sugar-boiling.

Pudding-Stone, a conglomerate, compounded of rounded stones, imbedded in a paste.

Puddle, a mixture of tempered clay and sand, used for engineering purposes.

Puddle-Rolls, a pair of large heavy rollers with grooved surfaces, between which iron is passed, to be flattened into bars.

Puddling. See Iron, p. 610.

Pueblo and Arkansas Valley R.R. runs from State line, Kansas, to Pueblo, Col., 137 m.; extension from La Junta, Col., to line of N. Mexico, 93.35 m.; total length of line, 230.35 m. This Co., whose financial agency is in Boston, is the consolidation (Oct. 1, 1875) of the Pueblo and Arkansas Valley, and the Colorado and New Mexico R.R. Cos. The road was leased on the same day to Atchison, Topeka, and Santa Fé R.R. Co., in the interest of which it was built. Cap. stock, \$4,862,700; funded debt, \$2,786,000.

Puer, a tanner's name for dog's dung, used as an alkaline steep in some of the processes, to remove the lime from the pores, and destroy the grease in the skin, in order to fit it for receiving the tannin.

Puffing, giving a notorious publicity, by advertisement or otherwise, of a man's business or wares.

Pugging, working up clay for bricks. — A coarse kind of mortar laid on the boards between joists.

Pugil, a handful, as much as can be conveniently taken up between the two first fingers and the thumb.

Pug-Mill, a mill for grinding and mixing clay, etc., for forming bricks, which are afterwards pressed into moulds.

Pullah, a commercial weight in India, ranging, in different localities, from 138¼ lbs. to 325¼ lbs. There is a difference in buying and selling; for instance, a selling pullah will be 120 seers, or 240 lbs. 6 oz. 9 drachms; and a purchasing pullah, 126 seers, or 252 lbs. 6 oz. 14 drachms.

Pulled Otter, otter skins from which the external or long hair has been pulled off, leaving the soft fine wool or down underneath. See Otter.

Pullet, a young hen.

Pulley, one of the six mechanical powers, consisting of a small wheel turning on an axis, with a rope or chain passing over it. *P.* are of two kinds, fixed and movable. The fixed *P.* affords no economy of power, but merely changes its direction. The movable *P.* changes its position with that of the weight, and effects a saving equal to half the power. An equilibrium is preserved between the power and weight, when the weight is equal to the product of the power and twice the number of movable *P.* If the weight to be raised is divided by twice the number of *P.* in the lower block, the quotient gives the power necessary to raise the weight. *Ex.* Required the power to raise 600 lbs. when the lower block contains 6 *P.*: —

$$\frac{600}{6 \times 2} = 50 \text{ lbs., the power.}$$

Pullicate, a silk or gingham handkerchief.

Pullman Car. See Railroad Car.

Pulp, the soft part of fruit. — The covering of a coffee-berry. — Half-stuff, or the macerated materials for making paper.

Pulping-Machine, a masticator for reducing roots to a pulp for farm-animals' food.

Pulpit, a clergyman's rostrum in a church, of wood, iron, or stone.

Pulp-Strainer, a kind of sieve used in paper-making.

Pulque. See Agave.

Pulu, a brown thistle-down gathered from a kind of fern imported from the Hawaiian Islands, to mix with silk in the manufacture of silk. It is also used by upholsterers to stuff mattresses, beds, and cushions. It is shipped in large bales, and sold by the ton. *Imp.* free.

Pulver [Ger.], powder.

Pulverine, barilla ashes.

Pulverize, to reduce to fine powder, by beating or grinding, etc.

Pulverizer, a quartz-crusher; any machine for pounding substances to dust.

Pumice, the mash after apples have been pressed for cider.

Pumice-Stone [Fr. *pierre-ponce*; Ger. *Bimstein*; It. *pietra pomice*; Sp. *piedra pomez*], a light, spongy, vitreous stone, found usually in the neighborhood of volcanoes. It is used for polishing metals and marble, and smoothing the surface of wood and pasteboard. It is said to form a good glaze for pottery. The lighter species swim on water. their sp. gr. not exceeding 914. The island of Lipari, in the Mediterranean, is chiefly formed of pumice-stone, and may be said to be the magazine whence the world is supplied with this useful article. *Imp.* free.

Fig. 419. — Self-Feeding Punch (for Leather).

Pummel, the knob of a saddle.

Pump, a machine for raising liquids from one level to another either by atmospheric pressure or by direct action, and also for exhausting air from vessels. See Air-Pump, Archimedean Screw, Chain-Pump, Feed-Pump, Fire-Engine Pump, Force-Pump, Giffard Injecter, Rotary-Pump, Syringe, Turbine, etc.

Pump-Brake, lever by which a pump is worked.

Pumping-Engine, a steam-engine applied for lifting water from mines, supplying towns with water, etc.

Pumpkin, a species of gourd, the *Cucurbita pepo*, of which there are numerous varieties, varying in the shape and color of the fruit. The best varieties for table use are the sugar pumpkin, and the Nantucket.

Punch, an instrument of iron and steel operated by pressure or percussion, and used for piercing or perforating holes in plates of metal, wood, leather (Fig. 419), or other substances. The punches used in various mechanical trades have mostly a kind of hollow tube at the lower end of a shank. The extremity of the tube being made sharp, a smart blow will cause the punch to cut out a small circular piece of the substance. — A stone-cutter's tool for chipping. — A die for making printing-type. — A strong mixed beverage made of spirits, wine, water, sugar, lemon, and other flavoring ingredients.

Puncheon, a cask made of oak staves, iron hooped, supposed to contain 84 gallons, but varying with different liquors.

Punching-Machine, a machine for stamping holes through thick metal plates.

Punch-Ladle, a small ladle for dipping out punch into glasses, made of silver, hard wood, or other material.

Punjum, an unbleached, strong, fine cotton cloth made in India.

Punk. See Agaric.

Punta Arenas. See Costa Rica.

Puppet, the upright supports of a mandrel. — A little doll moved by wires in a show.

Purchase, anything of which the property is obtained by giving an equivalent price in money.— Any mechanical power which increases the force applied. — In seamen's language, to haul or draw; also a tackle or lift.

Purl, two rounds in knitting.

Purlins, pole plates; timbers lying across the main rafters of a building.

Purple. Purple colors and dyes are mostly produced by mixing reds and blues. There is one, however, orchil, which is a sort of natural purple, and there is another belonging to the coal-tar series See Aniline. The *purple of Cassius*, which is a chloride of gold and tin, produces the beautiful ruby color for glass-staining.

Purpurine, a substance extracted from garancine by alum.

Purse, a money-bag, of which there are various kinds, leather, netted, etc. See Porte-monnaie. — A Turkish sum of money equivalent to 500 piastres, or $25. In Persia the purse is 50 tomans of $2.50 each

Purse-Clasp, a snap and catch for a purse.

Purse-Loom, a lady's machine for weaving or netting fancy bead and silk purses.

Purser, a kind of cabin steward or providore in a passenger ship; the cashier of a mining adventure.

Purslane, a salad plant and potherb, the *Portulaca oleracea.*

Purveyor, one who supplies provisions; a providore.

Put-and-call. See Call.

Putty, a cement made of whiting and drying linseed oil, and employed by painters and glaziers. It is sometimes rendered a little elastic by the addition of a portion of tallow. It is packed for sale in bladders, kegs, and casks. *Imp.* duty, $1.50 per 100 lbs.

Putty-Knife, a blunt round-pointed knife, used by glaziers and painters, to spread putty.

Putty-Powder, a white powder, the pulverized oxide of tin, or of tin and lead mixed, used in polishing metals, glass, etc.

Puzzles, various articles of turnery ware and carving; dissecting maps, and pictures for children.

Puzzolana, volcanic ashes exported from Sicily and the Mediterranean, used in mixing with mortar to make hydraulic cement.

Pyrites, a term applied very indiscriminately to many of the metallic sulphides, especially to sulphuret of iron, a brassy-looking mineral, much employed in the manufacture of alum and sulphuric acid.

Pyrogallic Acid, an acid obtained by cautiously distilling either gallic or tannic acid. Among other uses it is employed to stain the hair brown.

Pyroligneous Acid, the vinegar obtained from hard woods by destructive distillation. See Acetic Acid.

Pyrometer, a kind of thermometer, which measures very high degrees of heat. The form adopted by Wedgwood acts by the continuous contraction of a small ball of porcelain clay when under the influence of a continuously increasing heat. It used to be supposed that the contraction was really uniform; but it is now known to fluctuate both with the height and with the duration of heating. Daniell's *P.* depends on the expansion of a bar of platinum enclosed in a cylinder of fire clay or plumbago; the expansion is tolerably uniform, but minute in quantity and difficult of observation. A more recent invention by Byström measures the amount of heat absorbed by a ball of platinum by the elevation of temperature of a known bulk of water in which it has been plunged. The apparatus is rather complicated; comprising a horizontal porcelain tube, another tube placed obliquely, a ball of platinum, a small iron rod, a small square brass cistern filled with water, a wooden box surrounding the cistern, and a small wire-gauze cage. This instrument is considered to be more accurate than either Wedgwood's or Daniell's. *P.* of some form or other are useful in the porcelain, enamel, glass, steel, and other manufactures.

Pyrophone, a musical instrument in which the various notes are produced by the burning of hydrogen gas within glass tubes of various sizes and lengths.

Pyrophorus, any substance which spontaneously takes fire when exposed to air.

Pyrophotography, a term applied to enamel photography and other photographic processes in which the heat of a furnace is used to fix the picture.

Pyroscope, a kind of differential thermometer used for measuring the intensity of heat radiating from a fire.

Pyrostereotype, a process in which a block of wood is prepared as a matrix for a fusible metal by burning away portions of its surface. The burning-tool is a delicate blade heated by a jet of flame, and is thrust down into the wood, making an incision of a given depth. A cast is then taken in type-metal; the lines being salient afford a printing surface. — *E. H. Knight.*

Pyrotechnist, a maker and vender of fireworks.

Pyrotechny, the art of making fireworks. The principal ingredients used are purified saltpetre, sulphur, and charcoal. Gunpowder is also used in the composition of fireworks. For this purpose it is first ground, or, as it is technically termed, *mealed.* In different fireworks the proportions of the materials differ very much; and great care and precaution are necessary in mixing and working them into a proper state for use. Camphor, alcohol, antimony, and other substances are em-

ployed when it is required to produce colored stars. When gold or silver rain is required, brass-dust, steel-dust, saw-dust, etc., are used. Steel-filings and cast-iron borings contain carbon, and give a brilliant fire with wavy radiations. Copper-filings give a greenish tint, zinc a fine blue, sulphide of antimony a greenish-blue, with much smoke. Amber affords a yellow fire with colophony and common salt; but the last must be very dry. All the salts of copper tinge the flames green; those of strontian, red; those of caryta, a peculiar green. Lycopodium burns with a magnificent rose-colored flame. It is principally used in theatres to represent lightning.

Pyroxylic Spirit, obtained from pyroligneous acid, is a cheap substitute for alcohol or spirit of wine in making varnishes, and in other processes in the arts. An unpleasant odor prevents it from being used as a beverage.

Pyroxylin, PYROXYLINE. See GUN-COTTON.

Pysa, a coin current in Central Asia, the 50th part of a Mahmoud-Shahi rupee.

Q

Quack, a pretender to a knowledge of physic.

Quack Medicines, nostrums which have a fictitious reputation for wonderful cures.

Quadrant, a mathematical instrument for taking astronomical observations and measuring altitudes and angular distances. It is now superseded by the MURAL CIRCLE (which see).

Quadrant Compasses, a carpenter's tool with an arc and a binding-screw.

Quadrant-Stand, the rest or support for a quadrant.

Quadrat, a piece of metal of the depth of the body of the respective sizes of types, and lower than the types themselves, so that a blank space is left on the paper when printed. An *en* quadrat is in thickness half the depth, an *em* equal in thickness and depth, a *two-em* quadrat twice the width, etc. They are used to fill out short lines, form white lines, etc. — A German measure of length. See GERMANY.

Quadrille-Band, a small band of musicians attending at evening parties, to play the popular airs for quadrilles, and other dances.

Quail, a bird resembling the partridge, of which there are several varieties. The common *Q.* of the U. States, *Ortyx Virginiana*, is very abundant in the E. States to the high central plains.

Quannet, a tool for working horn and tortoise-shell. It is a flat file with a hand at one side, and is used like a plane.

Quantar, the Egyptian term for cwt., equal to 110 lbs., but it varies for different commodities: for coffee, 108 lbs.; pepper, etc., 102; cotton, 120; gums, etc., 150 lbs.

Quarantine [Fr. *quarantaine ;* It. *quarantina*], a regulation to prevent the introduction of infectious diseases into a city or country, by obliging ships, goods, or persons leaving a place suffering from infectious diseases, to remain a certain time before entering another place. The first organized *lazaretto*, or pest-house, was erected in 1453, on the island of Sardinia; and the name is derived from the period of detention having been fixed at forty days. The period is now regulated according to circumstances, and special laws are prescribed regarding it. The laws regulating *Q.* are State laws, and vessels belonging to the U. States are required to conform to the laws in the same manner as merchant vessels. Every ship is furnished, by the sanitary authorities at the last port where it touched, with a *bill of health*, describing its state of health at the time of her clearing out. A *clean* bill imports that at the time of her sailing no infectious disorder was known to exist. A *suspected* or *touched* bill imports that rumors were afloat of an infectious disorder, but that it had not actually appeared. A *full* bill, or the *absence of clean bills*, imports that the place was infected when the vessel sailed. The duration of the *Q.* is regulated by the nature of these instruments.

The *Q.* laws of the different States are too voluminous to give in detail, and therefore there is here annexed only a synopsis of the *Q.* laws in force in New York City. It is the duty of the pilots to hail all vessels entering into the port of New York, and find whether they are subject to *Q.*; and, if they are, to bring them to anchor in the *Q.* grounds; also, to prevent any violation of the *Q.* regulations while they have charge of a vessel, such as communication between a vessel subject to *Q.* and the shore, etc., and to report all infringements of regulations to the health officer. Vessels arriving at the port of New York are subject to *Q.* as follows: 1st. All vessels direct from, or touching at any place where yellow fever, bilious malignant, or other pestilential or infectious fever existed at the time of their departure, or on board of which, during the voyage, any case of such fever has occurred, arriving between the 31st day of May and the 1st day of October, shall remain at *Q.* for at least 30 days after arrival, and at least 20 days after cargo has been discharged, unless the health officer, with the approval of the *Q.* commissioners, shall sooner grant a permit for said vessel or cargo, or both, to proceed. 2d. All vessels arriving between the 1st day of April and the 1st day of November, exclusive of the above-specified; all vessels from a foreign port, on board of which, during the voyage, or while at the port of departure, any person has been sick, or from any place in the ordinary passage from which they pass S. of Cape Henlopen, arriving between the 31st day of May and the 16th day of October; and all vessels from any place (including islands) in Asia, Africa, or the Mediterranean, or from any of the West Indian, Bahama, Bermuda, or Western Islands, or from any place in America, in the ordinary passage from which they pass S. of Georgia, arriving between the 1st day of April and the 1st day of November, are subject to *Q.* and other regulations, as the health officer may prescribe. The health officer must board every vessel subject to *Q.* or visitation immediately on her arrival, and make his examination. The powers of the Board of Health are ample to protect the port. The regulations are similar to those generally adopted, and include a fine of $2,000, and imprisonment of twelve months, to any master or crew of a vessel that shall refuse to submit to *Q.*, and also a fine of $500 and imprisonment for any violation of *Q.* The following *Q.* fees are paid on entering a vessel at the Custom House, viz.: —

Health officer's fees, each vessel	$6.50
U. States hospital fees, per head	.20
State " " "	1.00
Master's " " "	1.50

Quarry, originally a place where stones were squared; but now applied to a stone-bed whence materials for building or other purposes are dug or cut. Sometimes a hill is wholly or partially quarried away; sometimes a mid-opening is dug in the level ground, to reach valuable stone underneath. Whatever may be the kind of stone, the processes of quarrying bear a general resemblance in all.

The digging does not greatly differ from that for mineral ores. The *borer* or *jumper*, the *hammer*, the *scraper*, the *claying bar*, the *needle*, the *tamping bar*, — these are the chief mechanical tools. In rude countries the stone is loosened, dislodged, and raised wholly by mechanical means. But, practically, *blasting* is now very generally adopted as a powerful auxiliary to the quarryman. Under BLASTING the application of gunpowder to mining is described. In quarrying the details are varied by two circumstances, — the hardness of some of the stone, and the desirability of obtaining pieces of large size and regular shape. For granite the boring of the blast-holes is very tedious work, wearing out rapidly the steel of the jumper, and consuming much time and strength on the part of the workmen. Three men, working at one hole (one to hold and adjust the jumper, and two to strike it with hammers), can only make about 4 feet depth of hole, 3 inches diameter, in hard granite, in a day's work; the tool requiring to be sharpened every half-hour or so. It is altogether laborious work, for the hammer used in striking a 3-inch jumper weighs 18 lbs. There is another kind, called the *churn* jumper, which is used without a hammer, and is worked by a peculiar kind of twisting or grinding action, rapidly destructive of the steel bit at the end. The drilling process, effected by machinery, and employed in some kinds of tunnelling, is noticed under ROCK BORING. The number, depth, width, and direction of the bore-holes are made dependent on the natural stratification of the stone, its hardness, and the size of the blocks required; and the quantity of powder for the blast is determined by similar considerations. The introduction of the blasting-powder into the holes, and the *tamping* with clay, wood-plugs, etc., to ram it well in, require more care in quarrying than in mining. If the stone is of a kind which possesses *cleavage planes*, it is separated into parallel masses by means of iron wedges driven in with heavy hammers, without the tearing and disruption which result from blasting. Sometimes blasting is adopted, in the first instance, to loosen a large mass, and then this is further separated by means of wedges driven in at the cleavage planes. Nearly all the blocks of stone undergo some dressing or other after being separated from the parent rock; it can be done as cheaply at the *Q.* as elsewhere, and lessens the cost of freight. Along the lines selected for the severence, iron wedges are driven into holes bored in a row; and the stone splits by the simultaneous percussion of many such wedges. Some of the irregularities are then removed by *spalling*, or striking with an axe-formed hammer, or by means of a *kevel;* next comes *scabbing*, which brings the stone to a general

level, though very rough, by the blows of heavy, pointed picks (this relates to hard stone, such as granite) The *grinding* and *polishing* are not done at the *Q.*, although the *Q.* owners may have an establishment for that purpose near at hand. Softer kinds, such as freestone and sandstone, are much more easily dressed at the *Q.* For various subsidiary details, see BLASTING, GRANITE, SAFETY-FUSE, SLATE, STONE, etc.

Quart, a liquid measure of $\frac{1}{4}$ of a gallon; and a dry measure of 0.03125 bushel. The imperial quart of England is equal to $\frac{3}{10}$ of a gallon.

Quarter, the fourth part of anything. As a term of weight, it denotes the fourth of a hundred weight, or 28 pounds; as a dry measure it signifies the fourth of a chaldron. — That part of a ship's side which lies toward the stern, or is comprehended between the aftmost end of the main chains and the sides of the stern, where it is terminated by the quarter pieces.

Quarter-Day, the day which terminates a quarter, or when rent is due. The *Q.-D.* for payment of store rents in New York are the first days of August, November, February, and May.

Quarterly, payments made three-monthly. — A literary publication issued every three months.

Quartern, a name given to the gill, the fourth of a pint; also the fourth part of a peck; a 4 lb. loaf.

Quarto, abbreviated 4TO, a book of 4 leaves or 8 pages to the sheet of medium-sized printing paper.

Quartz, crystallized silica, the most abundant of all minerals. As a mineral, it is properly colorless; but it occurs also in various shades of color, forming the amethyst when purple, topaz when yellow, cairngorm when smoke-color, and passing, by mixture with other silicious minerals, into jasper, hornstone, chert, flint, chalcedony, agate, and numerous others. *Q.* veins, with few exceptions, form the gangues in which gold is found, and it is probable that most of the gold which is obtained from alluvial and drift deposits came originally from the *Q.* veins.

Quass. See BEER.

Quassia, a name for some bitter woods. — The Surinam *Q.* is the produce of *Quassia amara*, and the American *Q.* (which grows best in the Caribbean Islands), of *Picræna excelsa*. The wood is of a pale yellow color, and inodorous; taste, intensely bitter. It is used in medicine, and brewers are said to use the chips freely as a substitute for hops, although they have narcotic properties. It is imported in billets of various sizes, from an inch to near a foot in diameter, and several feet in length, and sold by the ton. *Imp.* free.

Quay, a landing-place or wharf for loading and unloading goods from ships.

Quayage, a charge for using a berth alongside a quay; wharfage.

Quebec, a city and port of entry of Canada, capital of province *Q.*, on the N. W. bank of the river St. Lawrence, about 340 m. from its mouth, in lat. 46° 49′ 1″ N., lon. 71° 13′ W. *Q.* is situated on a ridge or promontory, formed by the St. Lawrence on the S. and W., and the river St. Charles on the E. The extremity of this headland, called Cape Diamond, is about 345 feet above the level of the water, and on it the citadel is built. The town extends from the citadel, principally in a N. E. direction, down to the water; and is, from the difference of elevation, divided into the upper and lower towns. From their situation many of the streets are uneven; they are, also, for the most part, narrow; but they are either well-paved or macadamised. The harbor, or basin, lies between the town and the island of Orleans. It is safe and commodious: the water is about 28 fathoms deep, with a tide rising from 17 to 18 feet; and at springs from 23 to 25. The navigation at *Q.* closes towards the end of December, and opens in April. Below the city the river is seldom frozen over, but the masses of floating ice, kept in constant agitation by the flux and reflux of the tide, render navigation impracticable. Next to Montreal, *Q.* is the most important centre of maritime commerce of the Dominion of Canada, and is one of the largest lumber and timber markets in America. Shipbuilding is also an important industry. *Q.* has three lines of transatlantic steamers, two of which for Liverpool and Glasgow, and one for London. There are also weekly steamers for the Gulf ports, daily steamers for the Saguenay during the summer months, and semi-weekly for the stations intermediate between *Q.* and Three Rivers. Pop. 59,699.

Queensland, the most recently organized British colony in Australia, situated between lat. 10° 40′ and 40° 29′ S., lon. 138° and 153° 30′ E., comprises the whole N. E. portion of the Australian continent. Area, 669,520 sq. m.; capital, Brisbane.

Q. is well adapted for the production of cotton (which is said to be indigenous here, and, from the absence of severe frosts, perennial), sugar, maize, wheat, arrowroot, and tobacco; also, the growth of wool, which is as yet the staple production: rich gold, copper, tin, quicksilver, antimony, and coal mines are found in several districts: timber also of fine quality, the Moreton Bay pine and the *Dammara robusta*, together with the Cedar of Queensland, forming valuable products for export. The broad plains afford the richest pasturage. At the end of 1878, the horses numbered 133,625, and the cattle, 2,079,997. It is estimated that there are 7,315,000 sheep and 53,455 pigs; both cattle and sheep are frequently condemned to the boiling-down process for the sake of their tallow and skins. Enterprising colonists, however, have succeeded in preserving the meat for exportation to Europe. The estimated population in 1878 was only 195,092, — males, 119,403, females, 75,689.

Brisbane, a seaport and the capital of *Q.*, situated on Brisbane River, about 25 m. from its entrance into Moreton Bay, 440 m. N. N. E. of Sydney. The river, which is about $\frac{1}{4}$ m. broad opposite the town, is navigable for vessels of considerable burden, and has been made more accessible by the partial removal of the bar at its mouth. Regular steam communication is kept up with Sydney and other Australian ports, and a very flourishing trade is carried on in the export of wool, cotton, tallow, and hides, and the import of European manufactures. Pop. 25,000.

Queen's Metal, an alloy, imitating silver, which has a fine lustre, and is composed of 9 parts tin and 1 part each of lead, antimony, and bismuth.

Queen's Ware, the name under which was formerly known Wedgwood's fine glazed cream-colored earthenware. The term is now applied to a common kind of cream-colored pottery.

Quercitron, the commercial name for the bark of the black oak, *Quercus tinctoria*, of the U. States, which is largely employed in this country as a dye. Great quantities of it, reduced to a coarse powder, are shipped to Europe, chiefly from Philadelphia, where it is similarly used, principally in calico-printing. When its decoction has been deprived of tannin by means of glue, a fine yellow color is obtained upon fabrics mordanted with alum, and various shades of olive with iron mordants. The coloring principle is called *quercitrine*, or from its acid reaction *quercitric acid*. The bark is also used for tanning, but the yellow color it imparts to leather is objectionable.

Quern, a hand-mill of the ancient pattern, for grain.

Quicklime, caustic lime; calcined limestone, which has lost its carbonic acid by exposure to a strong heat; the lime of commerce.

Quickset, a contrivance used in floor-cloth manufacture, consisting of a screw and nut, provided with a large hook at the top, and a small pointed hook at the bottom.

Quicksilver. See MERCURY.

Quill, the name for a pivot or axle on a shuttle, which is loaded with weft yarn. — The hard and strong feather of the wing in geese and swans, formerly used in large quantities for making writing pens. *Imp.* (prepared or not) free.

Quill pens. Notwithstanding the vast use of steel pens, the *Q* still remains in favor with many; for no metallic pen whatever has yet been invented equal to the *Q.* in certain qualities. The goose, swan, crow, ostrich, and turkey yield *Q.* suitable for making into pens; but the first-named are by far the largest in demand. Some of the Russian geese are reared principally for the sake of the *Q.*, yielding about twenty each in a year on an average. The size of the barrel is the chief test of excellence. In *Q.*-dressing, the *Q.* are sorted into *primes, seconds*, and *pinions*. They are plunged into hot sand, which loosens the outer skin, and enables it to be scraped off; the inner membrane is also shrivelled up by the heat, and the oily matter dissipated. The processes are repeated two or three times until the barrel of the *Q.* becomes horny and transparent. They are sometimes hardened and made yellow by means of nitric acid or alum-water. Some *Q.*-dressers use hot water instead of hot sand. *Crow Q.* are used for making small, fine pens, useful in some kinds of drawing. *Q. nibs* are made by cutting a *Q.*-barrel into six or eight pieces, shaped like the familiar steel pens, by the aid of a few simple tools. In making *Q.* pens for sale, the penknife is found to be more expeditious than any machine ever yet invented; a skilful hand will make 800 in a day.

Quill-Bits, instruments for boring wood.

Quilling, a narrow bordering of net.

Quill-Nibs, small pens for placing in holders.

Quilt, an outer bed-covering, of which there are many kinds, as Marseilles summer *Q.*, white or colored, damask *Q.*, cot or crib *Q.*, etc.

Quilting, a kind of figured material, made plain or colored, for bed-covers, toilet quilts, and vestings; a padding or lining.

Quincaillerie (Fr.), hardware; articles of copper, brass, and iron.

Quince-Tree. The common *Q.*, *Cydonia vulgaris*, is a low tree, seldom exceeding 15 or 20 feet in height, with a crooked stem, and tortuous, rambling branches. The bark is smooth and brown, approaching to black. The leaves are roundish or ovate, dusky green above, and whitish underneath. The flowers, which put forth in the middle and N. parts of the U. States in May and June, are large, with the petals pale-red or white, and the sepals of the same length as the petals. The flowers are succeeded by large fruit, of a globular, oblong, or pear-shaped form, of a rich yellow or orange color when ripe, of an austere taste, and emitting a peculiar and rather pleasant smell. The wood of the *Q.*, when found of sufficient dimensions, is applied to the purposes of turnery; but from its small size this tree is almost entirely cultivated for its fruit, or as stocks on which to graft the mountain ash and the pear. The fruit is seldom eaten by itself, but is generally preserved in sirup, or is made into marmalade, or is mixed with apples in tarts. The seeds are sold to some extent for making a gummy fixature for the hair, and for a mucilage to be applied to cracked lips, etc.

Quinhon. See COCHIN CHINA.

Quinine, SULPHATE OF QUININE, the most important of the alkaloids obtained from the Cinchona or Peruvian barks, being one of the most valuable febrifuges and antiperiodics that we possess. It is extensively manufactured, chiefly in Paris and Philadelphia, but, owing to its high price, it is frequently adulterated with various substances. *Imp.* free.

Quintal, a gross weight, which varies in different countries. The metrical *Q.* of France, Germany, etc., is 100 kilograms or 220 lbs. See BRAZIL, SPAIN, etc.

Quire, a collection of paper consisting of 24 sheets, each having a single fold, — the $\frac{1}{20}$ of a ream.

Quito. See ECUADOR.

Quoddy, a name in New Brunswick for smoked or salted herring.

Quoins, wedge-like pieces of wood, used by printers to block up the forms in the chase, and keep the type firmly secured. — A wooden wedge for the breach of a gun to rest upon.

Quoit, a flat iron ring for throwing at a mark in the game of quoits.

Quorum, a legal or sufficient number of a committee, or board of directors, to hold a meeting and transact business.

Quotations, current prices for stock and shares, or for articles of produce in the market for sale. — Printers' marks, as follows, [“ ”], showing that passages have been cited or quoted.

R

Rabannes. See MADAGASCAR.

Rabbet, in shipbuilding, that part of the keel, stern, and stern-post of a ship which is cut for the plank of the bottom to fit into.

Rabbet-Plane, a carpenter's tool for cutting down the edge of a joint square.

Rabbit, a prolific rodent animal of the hare family, which, besides its employment as food, furnishes to commerce useful articles in its skin. See FUR.

Rabble, a furnace tool; an iron rake for skimming off the slag in calcining metals.

Racahou, RACAHOUT, an Arabian substitute for chocolate; a preparation of roasted acorns powdered with sugar and aromatics, sold at drug-stores under the name of *Racahou des Arabes*.

Raccoon, RACOON, a small species of bear found generally over the U. States, but more abundant in the Southern States, valued for its fur. See FUR.

Race, a distinct or particular breed of animals. — A contest of speed between horses, etc. — A strong current or rippling tide.

Race-Course, the canal along which the water is conveyed to and from a water-wheel. — A level ground on which horse-races are run.

Race-Horse, a thorough-bred horse, trained to run for prizes.

Rachi, arrack, a spirituous drink made in Turkey.

Rack, a wooden frame for hay in a stable, or for bottles, plates, etc., to drain in. — An inclined plane on which ore is washed. — A strong wooden frame-work, supplied with several shears for receiving the running rigging; a rack-block. — A toothed wheel or bar of metal. *Rack work*, in machinery, is a cog-wheel working into a cogged bar. If the wheel rotates, it will make the bar advance longitudinally; if the bar advances, it will cause the wheel to rotate.

Rack-Chase, in printing, the frame in which the chases are kept.

Racket, a stringed battledoor for striking a racket-ball. — A snow-shoe.

Racking, clearing wine in casks from its lees by decantation, after fermentation or fining. — In mining, washing off the earth and impurities from the ore.

Racking-Can, a metal vessel containing sour beer, in which iron wire is steeped for wire-drawing.

Rack-Saw, a wide-toothed saw.

Radeau [Fr.], a raft; a float of timber.

Radiometer, a forestaff; an instrument for taking the altitudes of the celestial bodies.

Radish, a small well-known esculent root, the *Raphanus sativus*, and its varieties, which are subacid, succulent, and tender when young.

Raffle, the disposition of an article by lottery, according to throws of dice.

Raft, a rough float of spars or planks; an extensive collection of rough or squared timber logs drifted or floated down a stream. Some of the timber rafts which descend the Mississippi, the Ohio, and the St. Lawrence, are of immense size, and of considerable value.

Rafters, the ribs of the roof of a house; the beams on which the roofing rests.

Raftsman, the manager of a raft of timber.

Rags [Fr. *chiffons;* Ger. *Lumpen;* It. *strasci, strazze;* Sp. *tropos, harapos*], the fragments and shreds of worn-out garments and drapery, — woollen, linen, or cotton, — collected for various purposes throughout the country, and, besides, largely imported. Woollen rags are used for working up into shoddy, or coarse cloth and druggets, and for flock-paper; linen rags for making lint and paper; and cotton rags for paper-pulp. Rags to be used in the manuf. of paper are known in commerce as *paper-stock*. For the year 1879, our imports of cotton or linen rags for paper-making amounted to 89,962,702 lbs., valued at $2,402,457, — of which 39,854,196 lbs., valued at $951,647, came from England; 16,326,102 lbs., valued at $499,853, from Germany; and 13,873,729 lbs., valued at $546,256, from Italy. See PAPER (MANUF. OF).

Imp. duty: Rags for making paper, free; woollen rags, 12 cts. per lb.; rag pulp, in sheets or boards, as manuf. of paper, n. o. p. f., 35 per cent; all rags, of whatever material, n. o. p. f., 10 per cent.

Ragstone, a description of hone-slate, used as whetstone.

Rag-Wheel. See COG-WHEEL.

Rahmel, REMEL, a German term for a bundle of flax of 20 lbs.

Rail, a horizontal timber in a piece of panelling. — A piece of wood resting on stakes or posts, forming part of a fence of wooden rails. — A long narrow bar of iron or steel used for railroads. Important improvements are being rapidly made in the railroad rails, chiefly by the substitution of steel for iron. A few years ago, two Bessemer steel rails were tested against two iron rails, alike in size and shape, and subjected to just the same amount and weight of traffic. After three years' incessant wear, during which the iron rails had been removed and renewed no less than seven times, the steel rails were found to be so little worn as to be capable of rendering much longer service. The iron rails had been worn on both surfaces in succession, while those of steel had only been worn on one. It was calculated that the steel rail was twenty times as durable as the iron; and as the difference in the cost of the two metals is not nearly so great as this, steel rails will be cheaper in the end. It was found that 10,000,000 wheels had passed over the steel rails before the weight was reduced by wearing 7½ lbs. per yard; in other words, 370 wheels, at the average rate of speed, only rub off one grain weight from a yard of steel rail. For statistics of manuf., see IRON. For *Imp.* duty, see IRON and STEEL.

Railroad, RAILWAY. The idea of a perfect *R.* is that of a straight and level line from one terminus to another; but there are many circumstances which prevent such an idea from ever being carried into practice. First, it is desirable that the line should pass through important towns situated near the route; and then the cost of making the roadway straight and level, in spite of natural obstacles, would be often so great, that to avoid it detours and inclines must be submitted to, the inconvenience and the increased length of road being balanced by the saving in the cost of construction. It is the business of the engineer who lays out the line to take all these circumstances into consideration, after he has made a careful survey of the country through which the line is to pass. The cost of making *R.* varies, of course, very much according to the number and extent of the tunnels, cuttings, embankments, or other works required. The average cost of each

mile of *R.* in the U. States is $51,543 (see below, Table No. 3); while in Great Britain, owing to the great value of the ground, every inch of which is to be bought at a high price from land-owners, the average value per mile is about $175,000. The road itself when the rails are laid down is called *the permanent way*, perhaps originally in distinction from the temporary tramways laid down by the contractors during the progress of the works. The permanent way is formed first of *ballast*, which is a layer of gravel, stone, or other carefully chosen material, about 2 ft. deep, spread over the roadway. Above the ballast and partly embedded in it are placed the *sleepers*, which is the name given to the pieces of timber on which the rails rest. These timbers are usually placed transversely, that is, across the direction of the rails, in the manner shown in Fig. 420. This figure also represents the form of rails most commonly adopted, and exhibits the mode in which they are fastened down to the sleepers by means of the iron *chairs*, *b c*, the rail being firmly held in its place by an oak wedge, *d*. These wedges are driven in while the rails are maintained at precisely the required distance apart by the implement, *e f*, called a *cramp gauge*, the chairs having previously been securely

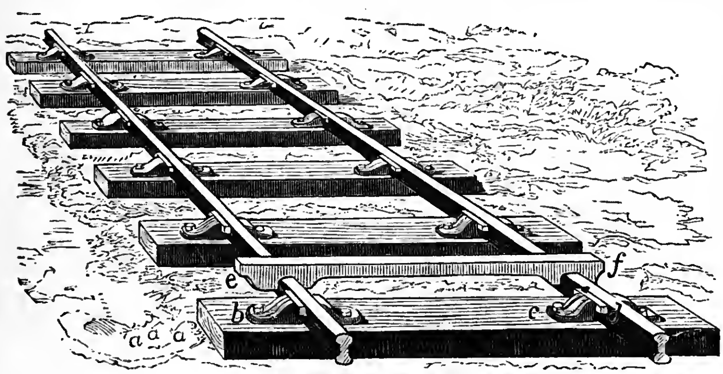

Fig. 420.—Rails and Cramp-Gauge.

attached to the sleepers by bolts or nails. The double T form of rail has several important advantages, such as its capability of being reversed

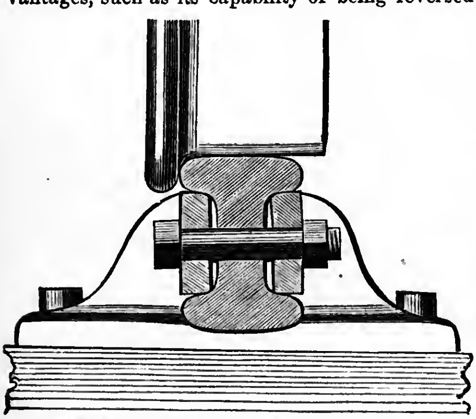

Fig. 421.—Section of Rails and Fish-Plates.

when the upper surface is worn out, and the readiness with which the ends of the rails can be joined by means of *fish-plates*. In Fig. 421 we have the rail and fish-plates in section. The holes in the rails through which the bolts pass are not round but oval, so that a certain amount of play is permitted

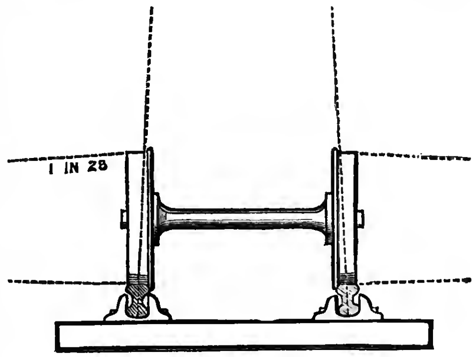

Fig. 422.—Conical Wheels.

to the ends of the rails.—It may easily be seen on looking at a line of rails that they are not laid with the ends quite touching each other, or, at least, they are not usually in contact. The reason of this is that space must be allowed for the expansion which takes place when a rise in the temperature occurs. If the rails are laid down when at the greatest temperature they are likely to be subject to, they may then be placed in actual contact; but in cold weather a space will be left by their contraction. For this reason it is usual when rails are laid to allow a certain interval: thus, rails 20 ft. long laid when the temperature is 70°, are placed with their ends $\frac{1}{20}$ of an inch apart, at 30°, $\frac{1}{10}$ of an inch apart, and so on. The neglect of this precaution has sometimes led to damage and accidents. A certain *R.* was opened in June, and after an excursion train had in the morning passed over it, the midday heat so expanded the iron, that the rails became in some places elevated 2 ft. above the level, and the sleepers were torn up; so that, in order to admit of the return of the train, the rails had to be hastily relaid in a kind of zigzag.—In Great Britain, the distance between the rails, or *Gauge*, is 4 ft. 8½ in. That gauge was first generally adopted in this country, but as we have no national control over the construction of *R.*, new companies soon deviated from it, and there were lines of 4 ft. 10 in., 4 ft. 9 in., 5 ft., 5 ft. 4 in., and 5 ft. 6 in. gauge. The creation, however, of many important continuous lines chiefly developed by the consolidation of independent ones, and the creation of others necessary to connect or extend the various parts of the trunk lines, has led to more uniformity.—The wheels of *R.* carriages and engines differ from those of ordinary carriages in being fastened in pairs upon the axles, with which they revolve (see Fig. 422). The tire of the wheel is conical, the slope being about 1 in 20; that is, in a wheel 5 in. broad the radius of the outer edge is ¼ in. less than that of the inner;

and the rails are placed sloping a little inwards. The effect of this conical figure is to counteract any tendency to roll off the rails; for if a pair of

Fig. 423. — CENTRIFUGAL FORCE.

wheels were shifted a little to one side, the parts of the tires rolling upon the rails being then of unequal circumference, would cause the wheels to roll towards the other side. The conical shape produces this kind of adjustment so well that the flanges do not in general touch the rails. They act, however, as safeguards in passing over curves and junctions. In curves the outer line of rails is laid higher than the inner, so that in passing over them the train leans slightly inwards, in order to counteract what is called the centrifugal force, to which anybody moving in a curve is subject. This so-called force is merely the result of that tendency which every moving body has to continue its motion in a straight line. A very good example of the effect of this may be seen when a circus horse is going rapidly round the ring. The inclination inwards is still more perceptible when a rider is standing on the horse's back, as shown in Fig. 423. The earth's attraction of gravity is pulling the performer straight down, and the centrifugal force would of itself throw her outwards horizontally. The resultant or combined effect of both acts is seen in the exact direction in which she is leaning, and it presses her feet on the horse's back, the animal itself being under similar conditions. It is obvious that the amount of centrifugal force, and therefore of inward slope, will increase with the speed and sharpness of the curve, and on the *R.* the rails are placed so that the slope counteracts the centrifugal force when the train travels at about the rate of 20 m. per hour. — A *R.* is, in an eminent degree, the result of civil engineering, a subject beyond the scope of this work. As mere mechanical labor, — the working and placing of earth, stone, brick, iron, and timber, — the making of a *R.* is like that of any other constructive work; but the planning to attain the desired results, and the overcoming of difficulties to this attainment require that sort of brain-work for which civil engineers are so eminent. Bridges, embankments, viaducts, galleries, cuttings, tunnels, inclines, sea-walls; the making of foundations for *R.* beneath the beds of rivers; the solidifying of quaking bogs and morasses; the crossing of bays which are twice a day dry land and twice a day under water; the carrying of a double traffic across a river by a *R. over* a carriage-way; the carrying of *R.* over ravines at a height of 200 or 300 ft. (Fig. 424), — these, and such as these, are the works which render *R.* engineering so vast and interesting a subject. Many collateral matters are noticed in this work under BALLAST, RAIL, ROLLING STOCK, STEAM-CARRIAGE, TURN-TABLE, TUNNEL, etc. Besides the following tables, statistics of American *R.* are given under the name of each State, while the financial condition of all important companies (excepting those which systematically refuse information) is noticed under their different names. Under the names of foreign commercial countries is generally noticed their *R.* system.

Fig. 424. — TRESTLE BRIDGE AT SHERMAN, NEAR DALE CREEK (PACIFIC RAILROAD) (650 *ft. long and* 126 *ft. high*).

The following lines on the actual condition of American *R.*, and statistical tables, are borrowed or condensed from the most valuable *Poor's Railroad Manual of the U. States:* "A remarkable feature in the *R.* operations of the country for several years past has been the enormously increased tonnage in the face of a large falling off of earnings. The decline in earnings has been due to very great reductions in charges for transportation. Within the last decade the tonnage traffic of our *R.* longest in operation has been fully doubled, while there has been only an inconsiderable increase in earnings from this source. Since 1873, the year in which the earnings of our *R.* reached their maximum, the increase of their tonnage has equalled fifty per cent, although the period has been one of unexampled business depression. The statements of the several roads show that at the very time at which there has been the greatest complaint of hard times, the movement of merchandise has steadily and largely increased. The tonnage of the New York Central and Hudson River R.R. in 1867 equalled 3,190,840 tons; in 1873, 4,393,955 tons; and in 1878, 8,175,535. The earnings from freight on this road in 1867 equalled $14,066,386; in 1873, $19,616,017; and in 1878, $19,045,830. The tonnage for the five years from 1874 to 1878 increased over 86 per cent, while the earnings were slightly reduced. The rate for the transportation of freight in 1873 equalled 1.572 cents per ton; in 1878, .910 of a cent per ton per mile. The vast increase of tonnage on this and other roads is a most encouraging feature, as, with a revival of general prosperity, which is showing itself on every hand, the *R.* will themselves start upon a new career, with an ample tonnage traffic, the rates on which are only to be slightly increased to add enormously to their net earnings. Had the rates of 1873 on the New York Central and Hudson River R.R. been maintained, the earnings of that road, from freight, in 1878, would have equalled $31,000,000, in place of $19,045,830, the amount received. The experience and example of this road may serve as an illustration for those of the whole country. Another favorable feature connected with our *R.* is the reorganization of the affairs of great numbers of those that had become pecuniarily embarrassed. Their reorganization has, as a rule, been upon a plan, or scheme, to reduce their interest-bearing securities to a sum the interest on which could in all probability be met by the accruing incomes, leaving dividends on common or preferred stock to be paid as earned. Such an arrangement will have the advantage of placing these enterprises upon a firm and stable foundation, and will help to give a market value to their securities somewhat in ratio to their actual value. The reorganization of our *R.* cannot fail to exert a most salutary influence upon the general business interests of the country."

1. *Table of miles of Railroads in each State and group of States at end of the years* 1878, 1876, 1874, 1872, 1870, and 1868: —

	1878	1876	1874	1872	1870	1868
Maine	989	989	957	871	786	560
New Hampshire	1,009	940	918	810	736	667
Vermont	873	810	778	710	614	605
Massachusetts	1,872	1,837	1,786	1,658	1,480	1,425
Rhode Island	208	189	173	136	136	125
Connecticut	922	918	897	868	742	637
NEW ENGLAND	5,873	5,683	5,509	5,053	4,494	4,019
New York	5,877	5,525	5,250	4,925	3,928	3,329
New Jersey	1,663	1,601	1,438	1,378	1,125	973
Pennsylvania	6,011	5,794	5,575	4,949	4,656	4,398
Delaware	280	272	272	227	197	165
Maryland and D. C.	952	944	900	866	671	535
West Virginia	669	618	615	609	387	365
MIDDLE STATES	15,454	14,754	14,050	12,954	10,964	9,765
Virginia	1,646	1,618	1,608	1,502	1,449	1,438
Kentucky	1,528	1,475	1,326	1,266	1,017	813
North Carolina	1,435	1,399	1,343	1,250	1,178	1,097
Tennessee	1,665	1,645	1,630	1,520	1,492	1,436
South Carolina	1,419	1,353	1,320	1,290	1,139	1,076
Georgia	2,415	2,306	2,260	2,160	1,845	1,575
Florida	487	485	484	466	446	437
Alabama	1,839	1,800	1,782	1,628	1,157	853
Mississippi	1,126	1,084	1,018	990	990	898
Louisiana	466	466	466	466	450	335
SOUTHERN STATES	14,026	13,631	13,237	12,538	11,163	10,068
Ohio	5,151	4,687	4,398	4,108	3,538	3,398
Michigan	3,593	3,395	3,315	2,976	1,638	1,199
Indiana	4,198	4,003	3,890	3,649	3,177	2,600
Illinois	7,506	7,285	6,759	6,361	4,823	3,440
Wisconsin	2,810	2,636	2,546	1,878	1,525	1,235
Minnesota	2,535	2,020	1,990	1,906	1,092	572
Dakota Territory	320	275	275	275	65	....
Iowa	4,266	3,939	3,765	3,643	2,683	1,523
Missouri	3,286	3,146	2,880	2,673	2,000	1,354
Indian Country	275	275	275	275	....	....
Arkansas	783	767	700	450	256	86
Texas	2,428	2,031	1,650	1,078	711	513
Nebraska	1,344	1,217	1.107	1,051	705	473
Kansas	2,427	2,238	2,150	2,063	1,501	648
Colorado	1,165	957	682	483	157	....
New Mexico Terr'y	8	....	....	....	....	....
Wyoming Territory	472	459	459	459	459	447
Idaho Territory	80	....	....	....	....	....
Utah Territory	543	506	459	349	257	....
WESTERN STATES	43,190	39,836	37,300	33,677	24,587	17,488
Nevada	627	627	601	601	593	402
California	2,149	1,919	1,328	1,042	925	468
Arizona Territory	27	....	....	....	....	....
Oregon	283	248	248	241	159	19
Washington Terr'y	212	110	110	65	....	....
PACIFIC STATES	3,298	2,904	2,287	1,949	1,677	889

Recapitulation.

	1878	1876	1874	1872	1870	1868
New England States	5,873	5,683	5,509	5,053	4,494	4,019
Middle States	15.454	14,754	14,050	12,954	10,964	9,765
Southern States	14,026	13,631	13,237	12,538	11,163	10,068
Western States	43,190	39,836	37,300	33,677	24,587	17,488
Pacific States	3,298	2,904	2,287	1,949	1,677	889
Grand Total	81,841	76,808	72,383	66,171	52,914	42,229

2. *Table showing the mileage, gross and net earnings, freight and passenger earnings, and dividends of the Railroads of the U. States for 3 years,* 1876–1878, *arranged by geographical divisions:—*

	1878	1877	1876
NEW ENGLAND.			
Miles of railroad	5,760	6,036	5,783
	$	$	$
Earnings from passengers	17,967,766	20,065,709	20,516,215
" " freight, etc.	22,292,437	24,524,756	25,244.778
" " all sources	41,260,203	44,590,465	45,760,993
Net earnings	13,685,927	13,735,746	15,379,072
Dividends	7,566,655	6,977,726	7,607,973
MIDDLE STATES.			
Miles of railroad	14,600	13,607	13,647
	$	$	$
Earnings from passengers	35,953,207	39,255,780	47,483,865
" " freight, etc.	119,505,761	116,687,341	130,129,542
" " all sources	155,458,968	155,943.121	177,613,407
Net earnings	61,559,993	61,033,089	69,382,517
Dividends	21,148,442	24,890,480	33,690,111
SOUTHERN STATES.			
Miles of railroad	12,498	11,272	13,948
	$	$	$
Earnings from passengers	11,221,014	9,953,090	11,877,901
" " freight, etc.	31,576,270	29,859,268	38,865.747
" " all sources	42,797,284	39,812,358	50,743,648
Net earnings	14,379,958	12,664,346	17,119,031
Dividends	2,805,799	2,740,793	1,860,351
W. AND S.W. STATES.			
Miles of railroad	41,605	39,136	36,753
	$	$	$
Earnings from passengers	48,995,480	44,437,039	43,362,211
" " freight, etc.	160,856,795	148,767,477	142,880,621
" " all sources	209,852,475	193,204,516	186.242,832
Net earnings	77,958,229	66,085,243	63,912,968
Dividends	19,341,222	14,556,462	17,394,532
PACIFIC STATES.			
Miles of railroad	2,064	1,896	1,126
	$	$	$
Earnings from passengers	2,104,501	2,330,079	1,727,911
" " freight, etc.	7,997,990	5,466,845	4,136,405
" " all sources	10,082,491	7,766,922	5,864,316
Net earnings	3,501,625	2,655,137	2,331,325
Dividends	930,000	240,099	187,701
PACIFIC RAILROADS.			
Miles of railroad	2,256	2,251	2,251
	$	$	$
Earnings from passengers	8.435,322	9,163,627	10,216,424
" " freight, etc.	22,216,808	23,006,455	20,817,379
" " all sources	30,652,130	32,170,082	31,033,803
Net earnings	16,489,425	15,053,582	17,033,517
Dividends	1,837,250	7,281,640	7,299,000

3. *Table showing the cost of road and equipment of all the Railroads of the U. States, per 100 miles.*

States.	Cost per 100 miles.
NEW ENGLAND STATES.	$
Maine	3,969,515
New Hampshire	2,938,435
Vermont	4,051,453
Massachusetts	6,441,121
Rhode Island	4,275,362
Connecticut	5,101,264
Average	4,826,481
MIDDLE STATES.	
New York	7,619,279
New Jersey	9,228,656
Pennsylvania	6,865,092
Delaware	2,053,947
Maryland and D. of C.	7,907,050
West Virginia (N.)	5,989,722
Average	7,447,102
SOUTHERN STATES.	
West Virginia (S.)	8,622,093
Virginia	3,935,422
Kentucky	3,173,464
North Carolina	2,528,776
Tennessee	3,005,156
South Carolina	2,706,957
Georgia	2,110,086
Florida	1,996,460
Alabama	3,861,482
Mississippi	2,431,803
Louisiana	3,981,392
Average	3,234,770
WESTERN AND S. W. STATES.	
Ohio	6,490,143
Michigan	4,076,349
Indiana	4,002,378
Illinois	4,415,352
Wisconsin	4,086,362
Minnesota	3,822,252
Dakota Territory	3,130,318
Iowa	3,324,225
Nebraska	3,792,115
Missouri	5,386,484
Kansas	4,609,411
Colorado	3,996,485
Arkansas	3,020,355
Texas	4,159,377
Average	4,646,275
PACIFIC STATES.	
California	7,340,338
Nevada	3,448,905
Utah Territory	3,326,444
Oregon	2,412,806
Washington Territory	3,860,759
Average	5,495,789
PACIFIC RAILROADS.	
Union Pacific R.R.	11,330,155
Central Pacific R.R.	11,961,227
Average	11,665,369

Recapitulation of above table by groups of States (average cost per 100 miles).

States.	Cost per 100 miles.
	$
New England	4,826,481
Middle	7,447,102
Southern	3,234,770
Western and S. Western	4,646,275
Pacific	5,495,789
Average	4,969,371
Pacific Railroads	11,665,369
UNITED STATES	5,154,310

4. *Table showing the length of the Railroads of the world in 1877, and the relation thereof to area and population of the respective countries.*

Countries and States.	Area.	Population.	Railroads.	Railroad Mile to	
	English Sq. Miles.	Census on Estimate.	Miles in Operation.	Sq. Miles of Area.	Number of Inhabitants.
NORTH AMERICA.					
United States of America	3,026,504	44,672,918	77,470	39.1	576.6
Dominion of Canada	686,353	5,169,789	5,219	131.5	990.6
United States of Mexico	829,916	8,133,719	378	2,195.6	21,517.8
Total North America	4,542,773	57,976,426	83,067	54.7	697.9
CENTRAL AMERICA AND W. INDIES.					
Honduras	47,100	351,800	66	713.6	5,330.6
Costa Rica	21,510	165,000	29	741.4	5,689.6
Panama	27,346	226,000	49	558.1	4,612.2
Cuba	48,489	1,370,211	459	105.6	2,985.2
Porto Rico	3,865	452,916	21	184.0	21,567.4
Jamaica	6,400	401,317	34	188.3	11,803.5
Barbadoes	166	31,719	6	27.7	5,286.5
Total Central and W. Indies	154,866	2,998,963	664	233.2	4,516.5
SOUTH AMERICA.					
Columbia	495,700	2,572,000	43	11,529.5	59,813.9
Venezuela	426,800	1,379,500	39	10,944.2	35,371.8
Guiana (British)	76,000	152,700	68	1,117.6	2,245.6
Brazil	3,956,000	10,278,000	1,357	2,915.3	7,574.1
Paraguay	72,000	1,000,000	47	1,531.8	21,276.5
Uruguay	73,500	600,000	231	318.2	2,597.4
Argentine Republic	542,800	2,500,000	1,466	370.2	1,705.1
Peru	520,600	3,000,000	1,238	420.5	2,422.1
Bolivia	473,560	1,600,000	38	12,467.3	42,105.3
Chili	249,900	2,250,000	691	361.6	3,256.1
Total South America	6,886,860	25,332,200	5,218	1,319.7	4,854.7

Length of Railroads of the world. — Continued.

Countries and States.	Area. English Sq. Miles.	Population. Census on Estimate.	Railroads. Miles in Operation.	Railroad Mile to Sq. Miles of Area.	Railroad Mile to Number of Inhabitants.
EUROPE.					
Great Britain and Ireland	122,520	32,103,972	16,872	7.1	1,859.6
France	207,149	36,391,702	12,722	16 3	2,860.5
Spain	182,713	16,681,719	4,112	44.4	4,056.9
Portugal	36,869	4,008,703	902	40.8	4,444.2
Italy	121,718	27,311,416	5,028	24.2	5,431.9
Switzerland	15,261	2,768,301	1,211	12.6	2,286.8
{ Austria	171,215	29,832,511	6,931	24.7	4,303.8
{ Hungary	69,391	10,429,339	4,023	17.2	2,592.4
Germany	224,370	42,783,415	18,229	12.3	2,346.9
Belgium	11,313	5,201,718	2,278	5.0	2,283.5
{ Holland	13,890	3,739,846	1,091	12.7	3,427.9
{ Luxemburg	990	200,178	169	5.9	1,184.5
Denmark	21,856	2,013,257	893	24.4	2,254.6
{ Sweden	170,100	4,001,218	2,597	65.5	1,540.7
{ Norway	123,228	1,642,327	369	333.9	4,455.9
Russia	2,120,397	72,149,336	13,702	154.9	5,265.6
{ Roumania	65,363	3,621,749	891	73.4	4,064.8
{ Turkey	189,220	12,791,715	997	189.8	12,830.2
Greece	19,250	1,461,201	7	2,750.0	208,743.0
Total Europe	3,886,813	309,133,623	93,024	41.6	3,309.2
ASIA.					
Turkey (Asia Minor)	673,744	13,686,315	279	2,414.9	49 054.9
India (British)	943,810	193,111,917	7,152	131.9	27,001.1
Ceylon	24,700	2,405,289	209	118.2	11,508.6
Philippine Islands	120,000	5,000,000	279	430.1	17,921.2
Java	51,336	13,019,108	296	173.4	43,983 5
China	1,298,000	338,719,600	10	129,800.0	33,871,960.0
Japan	152,604	33,110,503	41	3,727.0	807,573.2
Total Asia	3,264,194	599,052,732	8,266	394.9	72,471.9
AFRICA.					
Egypt	526,800	8,442,000	1,013	520.0	8,333.6
Tunis	72,500	2,000,000	92	799.0	21,739.1
Algeria	161,300	2,600,000	401	402.2	6,483.8
Cape Colony	119,328	1,000,000	136	877 4	7,352.9
Mauritius	708	300,000	66	10.7	4,545.4
Total Africa	880,636	14,342,000	1,708	515.6	8,396.9
AUSTRALASIA.					
Victoria	86,800	862,917	697	124.5	1,238.1
New South Wales	323,500	586,322	501	645.7	1,170.3
Queensland	678,000	179,448	452	1,500.0	397.0
South Australia	383,300	222,711	301	1,273.4	739.9
Western Australia	800,000	36,191	69	11,594.2	524.5
Tasmania	26,200	131,319	45	582.2	2,918.2
New Zealand	106,300	359,626	412	258.0	872.9
Tahiti	2,000	10,000	21	97.2	476.2
Total Australasia	2,406,100	2,388,534	2,498	963.2	956.2

Recapitulation by grand divisions.

North America	4,542,773	57,976,426	88,067	54 7	697.9
Central America and W. Indies	154,866	2,998,963	664	233.2	4,516.5
South America	6,886,860	25,332,200	5,218	1,480.1	5,444.2
Total America	11,584,499	86,297,589	88,949	130.31	977.7
Europe	3,886,813	309,133,623	93,024	41 6	3,309.2
Asia	3,264,194	599,052,732	8,266	394.9	72,471.9
Africa	880,636	14,342,000	1,708	515.6	8,396 9
Australasia	2,406,100	2,388,534	2,498	963.2	956.2
Total of the world	22,022,242	1,011,214,478	194,445	113.1	5,191.4
World without the railroad	29,313,268	401,719,205	......	.....	.....
World in the aggregate	51,335,510	1,412,933,693	194,445	263.5	7,253.7

Railroad-Bars, the rails. See RAIL.

Railroad-Car. In all human affairs, as well as in the operations of nature, the state of things at any one time is the result, by a sort of growth, of a preceding state of things. And in this way, it is certainly true of inventions, that they seldom, if ever, make their appearance suddenly in a complete and finished state. Railroads had their origin in the tramways of English collieries; and, in like manner, the railroad-car grew out of the colliery truck and the stage-coach; for when railroad-cars to convey passengers were first made, it did not occur to their designers that anything better could be done than to place coach bodies on the frame of the truck; and accordingly the early railroad-cars were formed by mounting the body

of a stage-coach, or two or three such bodies side by side, on the timber framework which was supported by the flanged wheels. The cut, Fig. 425, is from a painting in the possession of the Connecticut Historical Society, and it represents one of the first railroad trains in this country on its trial trip (1831), in which sixteen persons took part, who were then thought not a little courageous. Here we see that the cars were regular stage-coaches, and the same was the case in England. But it is very significant that, to this day, the stage-coach bodies are traceable in many of the cars now running on English lines, especially in the first-class cars, where, in the curved lines of the mouldings which are supposed to ornament the outside, one may easily recognize the forms of the curved bodies of the stage-coaches, although there is nothing whatever, in the real framing of the timbers of the railroad-car, which has the most distant relation to these curves. Then again, almost universally on English lines, the old stage-coach door-handles are still retained on the first-class cars, in the awkward flat oval plates of brass which fold down with a hinge. Many other points might be named which would show the persistence of the stage-coach type on the English railroads. Our illustration proves that America set out with the same style of cars; but America, as compared with the Old World, is *par excellence* the country of rapid developments; and there cars, or carriages, as they are called in the old country, have for a long time been made with numerous improvements, and in forms more in harmony with the railroad system, than the conservatism of English ideas, still cleaving to the stage-coach type, permitted to be attempted in that country.

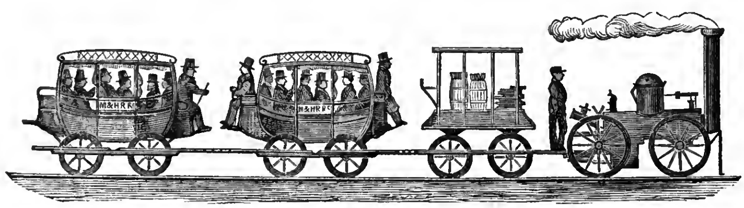

Fig. 425. — One of the First Steam Railroad Trains in the United States.

Most of the cars used on railroads are so familiar to every one that it is unnecessary to give any description of them. "Sleeping-cars," says the American Cyclopædia, "were first adopted by a few of the American railroads about 1858, but they were for the most part crude and unsatisfactory in their arrangement and appointments. It soon became apparent that a class of cars which could be used both night and day, and run between distant points over several different roads, would be necessary to supply the growing want of the public. In 1864 George M. Pullman invented and patented a car designed to meet all the requirements of the problem, and so great was its success that it grew rapidly into popular favor and supplanted all others. In 1867 the Pullman palace car company was organized for the purpose of conducting the sleeping-car business, now rapidly increasing in magnitude and importance. It contracts to furnish its cars to railroad companies for a period of 15 years, giving each company the option, if exercised within a reasonable time, of purchasing a half-interest in the cars assigned to its road, and of sharing equally with the Pullman company in the results of the business. The Pullman company furnishes the various kinds of cars required for the business, employs the servants and attendants, and maintains all the interior equipment pertaining to the sleeping accommodations. The railroad companies control the movements of the cars, carrying their passengers in them, receive the whole of the railroad fares, and maintain the outside and running gear of the cars, exactly as they do their own. Upward of 60 railroads in the U. States, Canada, England, and Italy have entered into contracts with the Pullman company. Some of them are participants in the entire business, while others are joint owners with the Pullman company in the cars assigned to their respective lines. The present standard sleeping-car exceeds the weight of the ordinary 12-wheeled first-class passenger-cars used on the leading railroads by about 2½ tons, the excess being due to the bedding and partitions essential to the sleeping arrangements. These cars are now used on more than 30,000 m. of railroad in America; and the advantages of the system have so recommended them that they have recently been adopted with favor in England and Italy, and will probably make their way at an early day to the railroads of the rest of Europe."

Railroad-Crossing, the place where an ordinary road crosses a railroad line.

Railroad-Gauge. See Railroad.

Railroad-Plant, the locomotives, cars, and general machinery for working a railroad.

Railroad-Scrip, the first or preliminary certificate issued on account of money paid for railroad shares.

Railroad-Signal, a telegraph, or light to give notice of the approach and departure of trains.

Railroad-Slide, a turn-table.

Rain-Gauge, an instrument for registering the fall of rain in a given period. It has also various other names; as, hygrometer, ombrometer, pluviometer, etc. Its principle and construction are of the simplest nature, but it is made of a variety of shapes.

Raisins [Fr. *raisins secs;* Ger. *Rosinen;* It. *uve passe;* Port. *passas;* Sp. *pasas*], the dried fruit of the vine. They are produced from various species of vines; deriving their names partly from the place where they grow, as Smyrnas, Valencias, etc.; and partly from the species of grape of which they are made, as muscatels, blooms, sultanas, etc. Their quality appears, however, to depend more on the method of their cure than on anything else. The finest *R.* are cured in two methods: either by cutting the stalk of the bunches half through, when the grapes are nearly ripe, and leaving them suspended on the vine till the watery part be evaporated, and the sun dries and candies them; or by gathering the grapes when they are fully ripe, and dipping them in a lye made of the ashes of the burned tendrils; after which they are exposed to the sun to dry. Those cured in the first way are most esteemed, and are denominated *R.* of the sun. The inferior sorts are very often dried in ovens. *R.* are imported in casks, barrels, boxes, and jars. The finest come in jars and quarter boxes weighing about 25 lbs. Some of the inferior sorts are brought to us in mats. Malaga *R.* are in the highest estimation. The muscatels from Malaga fetch fully a third more than any other description of *R.* *Imp.* duty, 2½ cts. per lb.

Rake, a gardening or agricultural tool with teeth and a handle; several of these, as horse-rakes, stubble-rakes, hay-rakes, and drag-rakes, are drawn by horses. — All that part of the hull of a ship which hangs over both ends of the keel; also the inclination of a mast from a perpendicular direction.

Ram, the perfect male of the sheep which butts or pushes with his horns; the castrate male is termed *wether.* — The loose hammer of a pile-driving machine. — The piston of an hydraulic press. — An instrument of modern warfare, reproducing, on a vastly more powerful scale, the beaked vessels of the ancients. The ram is a ship of extraordinary solidity and strength, propelled by engines of great power, and armed at the prow, below the water-line, with a sharp, heavy beak, nearly

pointed, and diminishing to a sloping edge on the upper side. This beak is nearly solid, or at least of the strongest possible formation; and is usually built as an independent adjunct to the ship, so that in the event of any very serious collision it may be buried in its victim, or carried away, leaving the vessel itself intact. Irrespective of this beak, the ram is constructed like any other iron-clad vessel.

Rame [Fr.], a scull or oar. — A ream of paper.

Ramie, a Javanese name, now generally adopted in this country, for the China grass, a fibrous plant belonging to the *Urticaceæ* or nettle family, of which there are three principal species, yielding a fine filament, the *Bœhmeria nivea* (Fig. 426), the *B. utilis*, and the *B. condicans*. The first two are the best; they have been successfully introduced in America,

Fig. 426.—Ramie.

where they proved adaptable to various latitudes, from the soil of New Jersey to that of the Gulf States. It is a remarkable perennial, thriving and propagating most rapidly wherever it takes root. It yields three crops in the N. and four or five in the S., wherever the soil is moderately rich, sandy, and well drained. The State of New Jersey has offered a bounty to encourage the development of the *R.* cultivation, which proved by experiment to be a probable source of profitable industries. The cultivation is easy and the growth rapid, in planting from roots or cuttings like potatoes. Once started, it yields a crop of 4 ft. high every two months. This crop consists of switches, like willows, which contain the filament. These stalks must be submitted to a decortication, extracting the clean fibre; the fibre is afterwards subjected to a chemical treatment, which removes the gummy matters and frees the pure lint. A mechanical decorticator and a chemical apparatus invented by M. E. Lefranc, New York, produce the *R.* fibre in a perfect state for spinning, and a remarkable imitation of silk goods can be manufactured from the yarns. But no American spinner has had yet the capability of adapting existing machinery to spin *R.* properly. This vegetable, fine, long, and strong fibre, must be worked on the worsted principle, and this complicated system, for a new product, requires a certain outlay of time and labor which the limited capacity of the worsted industry in the U. States has not permitted to invest so far. No doubt some one, sooner or later, will take hold of this new element and make a good specialty of it. The *R.* fibre, combed by the Lester or Noble circular comb, gives a beautiful *tops* liable to produce the finest yarn for dress, upholstery, and other goods of value. The refuse, or *noils* of the combing, can be used for mixed wool yarn on the ordinary card. Messrs. Shimer & Boyer, of Camden, made a successful experiment in mixing 25 % *R.* with 75 % wool. But the *noils* being the only condition in which *R.* can be worked in that sort of mixed product, the necessity of the worsted combing is absolute, and the future of *R.* depends upon the ability of the worsted manufacturers to take hold of it. The supply of the material is adequate to any demand, and the producers are waiting for the manufacturing start to develop the production to any extent. *R.* fibre in natural color, ready to spin, is worth 40 cts. per lb.; the yarn made from it would readily sell at $2.

Rammer. See Beetle.

Ramrod, an iron or wooden stick for ramming down the load or charge of a gun.

Rancho, a Spanish cattle-station.

Rancid, applied to fat that has become rank or sour.

Rancio. See Spanish Wines.

Rand, a border or thread. — A shoemaker's name for a thin inner-sole or cover of cork, leather, etc.

Randan, a miller's name for the finest parts of the bran or outside skin of the wheat.

Range, a fireplace and cooking-stove for a kitchen, etc. — The step in a ladder. — The compass or reach of a cable, gun, or piece of ordnance.

Rangoon, the chief port of foreign trade in British Burmah, about 26 m. from the sea, on the left bank of the E. branch of the river Irawaddy, in lat. 16° 46′ N., lon. 96° 17′ E. The harbor is capable of receiving vessels of 1,200 tons. The largest trade is with Calcutta. The principal exports are teak-wood, rice, raw cotton. Petroleum, which is there largely raised from wells, is also a considerable article of export. It has a greenish-brown color, a peculiar, rather fragrant odor, and the consistence of goose fat. Pop. 96,952.

Rape-Seed [Fr. *graine de navette*; Ger. *Rapsaat*] is the seed of a hardy biennial plant of the cabbage tribe, *Brassica napus*, little known in this country, but extensively cultivated in England, France, and Germany, for the sake of the oil. See Colza-Oil. *Imp.* duty, ½ cent per lb.

Rape-Wine, a name given to a poor, thin wine from the last dregs of raisins, which have been pressed.

Rappadura, a coarse kind of sugar made in Mexico. It is met with in long cylindrical pieces of about 1 lb. weight, each piece covered with flag leaves.

Rappee, a kind of snuff of either a brown or black color, which is sometimes scented. It is made from the darker and ranker kind of tobacco leaves moistened.

Raso, the Spanish name for satin.

Raspberry, the well-known fragrant subacid fruit of several shrubs of the genus *Rubus*, extensively cultivated in this country. It is employed for the dessert, and is also in very general use for jams and cakes; it is likewise converted into a kind of vinegar.

Raspberry-Vinegar, a pleasant acid beverage or flavoring liqueur, made from the juice of raspberries. Diluted with water it forms a refreshing drink in fevers.

Rasper, a kind of scraping or kitchen grater for rasping loaves, etc.

Rasping-Mill, a species of saw-mill for reducing woods to dust.

Ratafia, a delicious cordial, made by macerating the bruised kernels of apricots, cherries, and peaches, with cinnamon, cloves, and other spices, for a certain number of days in brandy, and finally sweetening the whole with lump sugar.

Ratch, a bar containing small angular teeth; a ratchet-wheel being a circular ratch, with teeth like a saw.

Rate, a tax levied ratably on persons assessable to it. — A standard or comparative price.

Rattans, a commercial name for the long trailing stems of the *Calamus royleanus* and *Roxburghii*, and various other species of palms, which form a considerable article of import from India and the Eastern archipelago. They are extensively used, when split, for caning chairs and for making rough brooms, and, when dyed black, as a substitute for whalebone for umbrella ribs, and for stiffening bonnets. For cane work those of a bright pale-yellow color, well glazed, and of a small size, are the best. They are purchased in bundles of 100 each, the ends being bent together and tied in the middle. In China and Bengal they are sold by the picul, which contains from 9 to 12 bundles. The value of our imports for the year 1879 was $135,678. *Imp.* free.

Rattany-Root, RHATANY, a powerful astringent root, the produce of *Krameria triandra;* used medicinally, and for tooth powder and mouth washes.

Ratteen, a kind of thick, twilled woollen stuff.

Ravelled, thread tangled or twisted.

Ravensara-Nuts. See CLOVE-NUTMEGS.

Raw Materials, a commercial name for goods and articles in their rough or undressed state, previous to manufacture; such as raw silk, raw cotton, raw or unrefined sugar, raw hides, etc.

Ray, a genus of cartilaginous fish, the *Raia*, some of which are edible.

Razor, a keen-edged knife or cutting instrument for shaving or removing the beard or hair.

Reaction Water-Wheel, the wheel of a mill where the water reacts on the curved vanes or buckets, producing a backward rotary motion.

Reader, a corrector of the press in a printing-office.

Reading and Columbia R.R. runs from Columbia to Sinking Springs, Pa., 39.50 m.; branches, 11.77 m.; leased lines, 15.30 m.; total length of road operated, 67.07 m. This Co., located in Philadelphia, was chartered in 1857, and the road, opened in 1862, is controlled by the Philadelphia and Reading R.R. Co., all accounts, however, being kept separately. Cap. stock and scrip, $958,373; funded debt, $2,004,166. Cost of road and equipment, $2,272,594.

Ready-Made, articles prepared beforehand, and kept in stock; not made to order or pattern.

Ready Money, a prompt payment for articles; not credit.

Real, plural REAUX, in the Spanish monetary system, is of two sorts, viz., a *real of plate*, and a *real vellon*. The former is a silver coin, varying in value from 10 to 12½ cents; a real vellon is a money of account, worth about 5 cents.

Realgar, one of the names of bisulphide of arsenic; red orpiment.

Ream, a quantity of paper of any size containing 20 quires of 480 sheets. The ream of most printing-paper is usually 500 sheets in America, and 516 sheets in England.

Reaper and **Mower**, mechanical contrivances for respectively cutting grain and grass, and which have superseded the former methods of the scythe and sickle. There are reapers and mowers of innumerable forms. The first machines were constructed to imitate, as nearly as possible, the hand process, cutters similar to ordinary scythes being used, and rotary motion communicated from the wheels supporting the machines. The cutters were afterwards materially improved by substituting a kind of shears instead of the scythe, and this again was superseded by a long series of double-edged pointed knives, placed at right angles with, and attached to, a long horizontal metal plate, the whole resembling a saw with coarse teeth. These are worked through mortised stationary guards fixed to the front of the machine, and, projecting forward, gather the grain or grass between them, when it is clipped off by the cutters. American reapers and mowers have been generally adopted in Europe and form an important article of export. For the year 1873 we exported 9,417 machines, valued at $893,972, of which France took 4,090, valued at $412,680; England 3,497, valued at $288,617; and Germany 936, valued at $86,184.

Reaping-Machine, a machine which cuts and lays corn; a REAPER (which see).

Rebate, a discount, or an allowance from the stipulated price, made in consideration of prompt payment, or for other reason. — A groove or channel sunk on an edge. — A kind of freestone. — A tool to beat up mortar.

Rebate-Plane. See RABBET-PLANE.

Receipt, an acknowledgment in writing of having received a sum of money, or other valuable consideration. It is a voucher either of an obligation or debt discharged, or of one incurred.

Receiver, a cashier. — One who knowingly takes stolen goods from a thief.

Recife, or PERNAMBUCO. See BRAZIL.

Recipe, a medical prescription. — A receipt for cookery.

Reciprocating Motion, the alternate up-and-down, or backward-and-forward, motion, as of a piston-rod. *Reciprocating-engine* is a name given to the common form of engine, in contradistinction to *rotary steam-engine*, in which the piston rotates in the cylinder, or the cylinder upon the piston.

Reciprocity Treaty, a treaty concluded between two countries, conferring equal privileges, whether for customs, charges on imports, or other purposes.

Reckoning, in navigation, the estimated place of a ship, calculated from the rate as determined by the log, and the course as determined by the compass, the place from which the vessel started being known. *Dead reckoning* means the same as *reckoning*, due allowance being made for drift, leeway, currents, etc.

Reclining-Chair, an easy-chair for invalids.

Record, a state paper; an official register.

Recording Instruments, a class of instruments by which results are obtained without the immediate attention of an observer, and they can be continuously recorded at every instant, day and night; but there is another and yet greater advantage in certain kinds of instruments which write their own records, in the fact that they can be made to register results which would altogether escape direct observation.

Among them are the *metereograph*, invented by Dr. Hough, in which the height of the barometer and the thermometer are registered, the operation being performed for both instruments with a single piece of mechanism and on the same sheet of paper; the *electrical anemometer*, for indicating and registering

the direction and force of the wind; and the *spirograph*, in which the rise and fall of the chest in breathing are similarly traced by the motions of a lever. In this instrument a small pad, which presses on the chest, communicates its movements to an elastic membrane, which, like the skin of a drum-head, covers one end of a cylindrical box maintained in a fixed position relatively to the person of the patient. The air in this box is in communication, by means of a flexible tube, with the interior of another similarly closed box; the elastic membrane of the latter acts against the short end of a lever, which is made to register its movements as in the sphygmograph; for the compression of the air caused by the rise of the chest is conveyed to the second box through the flexible tube. The curves furnished by this instrument also give valuable indications, and exhibit marked changes under any influence in the least degree affecting the respiratory system.

Rectified Spirit, a spirit twice distilled; alcohol with 16 per cent of water, the sp. gr. of which is 0.838; also a common name for raw spirit, or alcohol which has been redistilled and flavored.

Rectifier, one who concentrates, compounds, and flavors spirits for the market.

Rectifying. See DISTILLATION.

Red, one of the primitive colors, of which the chief commercial varieties are fine Venetian, red lead, orange, Indian red, and vermilion.

Red Chalk, REDDLE, a soft form of sesquioxide of iron used as a crayon in drawing.

Red Currant, the fruit of the *Ribes rubra*, largely cultivated for the dessert and for cooking. The juice is refrigerant and grateful to persons suffering from fever, and is made into wine.

Reddle. See RED CHALK.

Red Lead, the chromate of lead. See CHROMIUM.

Red Ochre. See OCHRE.

Red Pigments are derived from a great number of sources, including vermilion, Indian red, red lead, red ochre, cochineal, etc. *Chrome red*, which is used to impart a permanent orange to calico, is obtained by fusing 1 part of normal chromate of lead with 5 parts of nitre. See also ANILINE and DYEING.

Red Root, the *Ceanothus Americanus*, the leaves of which are used as a substitute for tea, and hence also called New Jersey tea.

Red Sanders-Wood, SANDAL-WOOD, an East Indian dye-wood, the produce of the *Pterocarpus santalinus*, a hard, heavy wood imported from Madras and Calcutta. Besides its use as a dye-wood, it is employed as the basis of various dentifrice mixtures. *Imp.* free.

Red Sea, or ARABIAN GULF, an inland sea between Africa and Asia (Arabia), lat. 12° 40′ to 30° N., lon. 32° 30′ to 43° 39′ E. Length, N. W. to S. E., upwards of 1,400 m.; breadth varies to nearly 200 m. At its S. extremity it communicates with the Indian Ocean by the strait Bab-el-Mandeb. In its N. part it bifurcates into the gulfs of Suez and Akabah, which enclose the peninsula of Sinai; and communicates with the Mediterranean by the canal of Suez. Depth varies; average about 100 fathoms. It abounds with islands and coral reefs. The country almost everywhere around it is mountainous. The S.E. monsoon blows constantly for eight months of the year, and during the remainder the N. W. monsoon. The navigation is difficult, owing to sudden changes of wind and heavy gales. Principal ports are Mocha, Hodeida, Loheia, Jiddah, and Yembo, on the Arabian side, and Suez, Kosseir, Suakin, and Massowah, on the Egyptian, Nubian, and Abyssinian coasts.

Red-Stuff, a name among watchmakers for some kinds of crocus, or the prepared powder from oxide of iron.

Red Tape, common narrow red silk ribbon, or red cotton tape, used in offices for tying up documents, now mostly superseded by India-rubber bands; also a term denoting a very punctilious adherence to roundabout official routine or formality. — *T. McElruth.*

Reduction, the process of separating a metal out of a metallic oxide, sulphide, etc. In some cases, this is effected simply by heat, but generally by the joint action of heat and deoxidizing agents. Upon the largest scale, coal, coke, or charcoal is almost always resorted to. See SMELTING.

Red-Wood, the name of a dye-wood obtained from *Pterocarpus santalinus*. See RED SANDERS-WOOD. The red-wood of the Turks is the wood *Cornus mascula*; that of the Bahamas comes from *Ceanothes colubrinus*; that of Jamaica from *Gordoniæ hæmatoxylon*; and that of the timber trade from *Sequoia sempervirens*. That, however, which is most common and used as a dye-wood is obtained from the Siberian buckthorn, *Rhamnus erythroxylon.*

Reed, the common name of tall grassy plants with hollow, jointed stems, comprising the genera *Phragmites* and *Arundo*, which are used for making walking-sticks, fishing-rods, etc. — In music, a thin tongue of wood or metal (formerly made actually from a reed), which, being set in vibration by the action of wind, gives the sound to certain musical instruments, such as the oboe, the clarionet, and the bassoon; as also in certain stops of the organ, in the harmonium, and the concertina. Sometimes the reed beats against its seat, and sometimes it is free, the latter variety being called the *free-reed.* — In weaving, a frame of parallel flat strips of wood, through which the warp-threads pass, set in the lathe or batten.

Reed-Organ, a melodeon or parlor-organ.

Reed-Pipe, a pipe of an organ furnished with reeds.

Reef, in navigation, that part of a sail, between the head and the reef-band, which is folded or rolled up to contract the sail, when the force of the wind renders it necessary. — *Reef-band*, a piece of canvas sewed across a sail, to strengthen it in the part where the eyelet-holes are formed for reefing. — *Reef-points*, flat pieces of braided cordage tapering toward each end, and passed through the holes in the reef-band of a sail, used in reefing it. — *Reef-tackle*, a tackle by which the reef-cringles or rings of a sail are hauled up to the yard for reefing.

Reel, a turning frame for winding thread; a wooden roller or bobbin for cotton, of wood, ivory, or pearl, with metal stems, plain or carved for a lady's work-box. — A yarn-measure. A cotton or linen reel is 54 inches in circuit; a worsted reel 30 inches.

Reel-Cotton, sewing cotton wound on reels, not made up into balls.

Reel-Stand, a holder for cotton reels for ladies' use, made of ebony or rosewood, etc.

Reeming, opening the seams between planks with a calking iron.

Reeve, in nautical parlance, to pass the end of a rope through a block or a loop.

Re-exchange, the price of a new exchange due on a protested bill.

Re-export, to ship again what has been brought in from abroad; a re-transit.

Referee, an arbitrator; one selected to give an opinion, or to settle points in dispute.

Reference, one of whom information is sought as to the probity, ability, or pecuniary condition of another.

Refiners'-Sweeps, the refuse filings or dust collected from the workshops of silversmiths and jewellers to be re-smelted.

Refinery, the place and apparatus for refining metals, sugar, liquors, etc.

Refining, the process of purifying metals, which is the last operation connected with smelting. The term is also applied to the purification, on a manufacturing scale, of sugar, petroleum, spirits, etc.

Refit, a putting in order; as the repairs of a ship; restoring damage or wear and tear; a renovating of that which is decayed.

Reflecting Telescope, a spy-glass, in which the rays from the object to be viewed are first received on a speculum.

Reflector, anything that throws back an image, as a looking-glass; a polished metal plate for reflecting the light in light-houses, etc.; a reflecting telescope.

Refractor, the refracting telescope. See TELESCOPE.

Refrigerator, an apparatus by which meats and drinks are kept cool or are reduced in temperature below the point of fermentative disorganization. Most of the older forms of refrigerators did not completely separate the ice from the food compartment, and many of them were merely chests with double sides separated by some non-conducting substance, as charcoal, in which the ice as well as the articles to be kept cool were placed on shelves indiscriminately. In either case the moisture from the evaporating ice filled the whole apparatus, and caused the contents to begin decaying soon after their removal, and indeed prevented their being preserved long while they were within it. The ordinary food-refrigerator, as now extensively manufactured by Mr. Sylvester Gray at Hunter's Point, Long Island, is remarkable for its effectiveness and reduced cost. It consists of a chest which has a separate compartment for ice and one or more compartments for the food. In the example (Fig. 427), a vertical channel divides

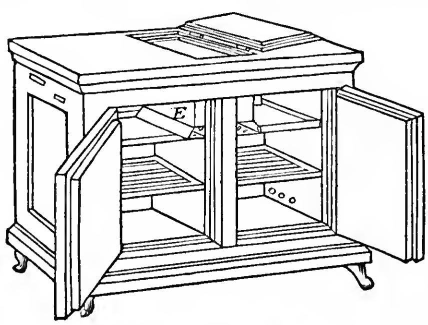

Fig. 427. — GRAY'S REFRIGERATOR.

the refrigerator into two separate chambers, each partitioned into three receptacles. Air circulates between the interior and exterior walls. Two front doors and one on top afford access. E is the ice-box, which cools the air in each of the side-chambers.

Regalia, a kind of cigar; the ornamental clothing, jewels, etc., worn by members of the masonic order, odd-fellows, knights-templar, and other societies, and by high officers and dignitaries.

Imp. free; but only for such articles as are worn on the person, or may be held in the hand while in the performance of some ceremony or official duty. Church vestments, etc., are not considered as regalia in the practice of the U. States custom-house; they are subjected to duty according to material.

Regatta, a contest of row-boats or sailing vessels for prizes.

Regenerating-Furnace, a furnace in which the outgoing heated volatile products are caused to heat a mass of material, which, when the direction of the current is reversed, heats the incoming air or gas with which the furnace is supplied. — *E. H. Knight.*

Regimentals, the official clothing, or uniform, worn by a regiment.

Register, a record. — The title of a ship, indicating to whom she belongs, and at what port she is registered. — A general term applied to any instrument or apparatus for noting down or calculating the performance of a machine, or the rate of motion of a process. — A kind of door-lift or iron-plate for regulating the draught in a stove or parlor grate. — The part of a telegraph apparatus for recording upon a strip of paper the message received. — In printing, the correspondence or relative position of pages or columns on the opposite sides of the sheet.

Registering-Instruments, machines or instruments which register or record, such as gauges, indicators, and tell-tales. See RECORDING-INSTRUMENTS.

Registration of Mail Matter. By a law passed March 3, 1855, the Post-Office Department of the U. States was authorized to establish a plan for the registration of valuable mail matter, on the payment of a registration fee, so as to secure greater certainty in the transmission of important letters. The government is not liable for the loss of any registered mail matter; but it is expected that before long Congress will pass a law giving authority to the Postmaster-General to carry into effect, both as to domestic and foreign registered matter, the general regulation of the Universal Postal Union (see POST OFFICE), which provides for the payment of 50 francs ($10) to the sender, or, at his request, to the addressee, of a lost registered article, by the administration upon whose territory or in whose maritime service the loss has occurred. The fee on any registered matter, domestic or foreign, is fixed at 10 cents on each letter or parcel, to be affixed in stamps, in addition to the postage. First, third, and fourth class matter (see POST OFFICE) may be registered. First-class matter, or matter on which letter rates of postage have been paid, must always be sealed. Third-class matter and fourth-class matter must be unsealed, fully prepaid at the proper rates, and conform to all requirements. No matter excluded by law from the mails can be registered. The total number of letters and parcels, domestic and foreign, registered during the year 1879 were 5,429,022, of which 989 were lost.

Registry, the registration or enrolment of ships at the custom-house, so as to entitle them to be classed among, and to enjoy the privileges of national ships.

The U. States have imitated the policy of other commercial nations in conferring peculiar privileges upon American-built ships, and owned by citizens. The object of the Registry Act is to encourage our own trade, navigation, and shipbuilding, by granting unusual and exclusive privileges of trade to the flag of the U. States, and by prohibiting the communication of those immunities to the shipping and mariners of other countries. The provisions are well calculated to prevent the commission of fraud upon individuals, as well as to advance the national policy. The registry of vessels at the custom-house, and the memorandums of the transfers, add great security to title, and bring the existing state of our navigation and marine under the view of the general government. By these regulations the title can be correctly traced back to its origin. The acts of Congress of 31st of December, 1792, and 18th February, 1793, constitute the basis of the regulations in this country for the foreign and coasting trade, and for the fisheries of the U. States; and they correspond very nearly to the provisions of the British statutes in the reign of George III. These acts relate to all ships employed at sea, which may be divided into five classes: 1. Ships of the U. States employed in foreign trade, which are entitled to be *registered;* 2. Ships of the U. States employed in the coasting trade or fisheries, which are

entitled to be *enrolled and licensed;* 3. Ships built out of the U. States, but owned by citizens, which are entitled to a *certificate of ownership;* but if wrecked in the U. States and repaired to the extent of three quarters of their value, they may be registered; 4. Ships built in the U. States, but owned wholly or partly by foreigners, which are entitled to be *recorded;* 5. Ships built out of the U. States, and owned by foreigners, which are considered alien vessels to all intents and purposes. Vessels actually registered, and vessels duly qualified for carrying on the coasting trade and fisheries, or one of them, are alone denominated and deemed *ships* or *vessels of the U. States*, entitled to the benefits and privileges appertaining to such vessels; and they continue to enjoy the same no longer than they continue to be wholly owned and commanded by a citizen or citizens of the U. States. Vessels built within the U. States, and vessels captured by citizens in war, and condemned as prizes, or seized and condemned for a breach of revenue laws, and wholly belonging to citizens, may be registered. No citizen who usually resides in a foreign country can, during such residence, entitle himself to have registered a ship owned in whole or in part by him, unless he be a consul or an agent or partner in some house of trade or partnership, consisting of citizens actually carrying on trade with the U. States. An American vessel, transferred by parol while at sea to an American citizen, and resold to her original owners on her return to port, does not lose her privileges as an American vessel. If one of two partners obtain a registry of a vessel by swearing that he and his partner, of the city of New York, are the owners, when in fact his partner is domiciliated abroad, the vessel is liable to forfeiture. No ships can be registered, or, if registered, can be entitled to the benefit thereof, if owned, in whole or in part, by a naturalized citizen, residing for more than one year in the country from which he originated, or for more than two years in any foreign country, unless he is a consul or public agent. But such ships may be registered anew on a *bona fide* sale to any citizen resident within the U. States. No registered ship, which has been seized or captured and condemned by a foreign power, can be registered anew, except regained by the original owner at the time of capture or seizure, or by his executors or administrators; but such a ship is deemed a *foreign vessel*, though purchased or owned by any other citizen. Ships entitled to be *recorded* and entitled to the benefits of *recorded ships* in the U. States are ships built in the U. States, and belonging wholly or in part to foreigners. Vessels entitled to be enrolled are vessels of twenty tons or upward, possessing the same qualifications and requisites as are made necessary for registering ships, *i. e.*, they must be built within the U. States, and be owned wholly by citizens. If under twenty tons, they are entitled to a *license*. No ships, unless enrolled and licensed, are deemed entitled to the privileges of American vessels employed in the coasting trade or fisheries; and if any not enrolled or licensed be found engaged in the coasting trade or fisheries, having on board any foreign articles or distilled spirits other than sea stores, they are subject to forfeiture, unless the vessel be at sea at the expiration of the time for which the license was granted; in which case the forfeiture is not incurred, provided the master prove the fact, and deliver his license to the collector of the district in which he shall first arrive, within 48 hours after his arrival. In the U. States no vessels are required to be registered. But to entitle them to the privileges of the U. States they must be registered; otherwise they are deemed alien ships. As is before stated, vessels engaged in the coasting trade or fisheries are liable to forfeiture if they have foreign goods on board, unless they are enrolled or licensed.

Reglet, a ledge of wood which printers use to separate the lines in posters and pages widely printed; a black border for columns of type.

Réglisse, the French name for licorice-root.

Regulator, that which regulates or controls; that part of a machine which serves to make the motion equable; as, the spiral spring attached to the balance of a watch; the throttle-valve of a steam-engine; the pendulum or balance of a time-piece, a fan-wheel, etc.

Regulus. See ANTIMONY.

Rehabilitation, the restoration of a bankrupt or other person to his former civil rights.

Rei, REA, a small money of account in Portugal and Brazil, the $\frac{1}{1000}$ part of a milrea, or about the tenth of a cent.

Reichs Thaler. See GERMANY (MONEY).

Rein, a leather strap to guide a horse; the part of a bridle connected to the bit.

Reindeer, the *Cervus tarandus*, one of the most useful animals to the Laplanders and Norwegians, serving as a beast of burden, and supplying them with food and clothing, while of its milk they make cheese. Reindeer skins are occasionally imported to New York through the agents of the Hudson Bay Co.

Reine-Claude, the French name for the green-gage plum.

Reisner-Work, a kind of inlaid work characterized by the use of woods of contrasted colors.

Reinsurance is the practice of the majority of Life and Fire-Insurance Cos. to grant policies for large sums and reinsure portions of the risks with other companies. This is, of course, a great convenience to the public, as there is but one premium to pay, and one company to look to, instead of many.

In *Fire* business the transactions may be effected singly, or in the aggregate by what is called "treaty." As an illustration of the former plan, suppose A. Co. to accept $50,000 upon a warehouse, while its "limit" — or the amount it retains upon each risk of the class — is $10,000. There is therefore a surplus of $40,000 to be dealt with. What is called a guarantee clerk (one who attends to this branch) goes round to a number of other Cos., B., C., D., E., with a short description of the property, etc., offering them a proportion of the insurance. If approved, a take note is issued, by which the issuing offices, B., C., D., E., undertake their proportionate parts of the original Co.'s liability. This, however, is only provisional. It is followed up by a properly executed or sealed "guarantee," by which this liability is more formally expressed; and a copy of the original, or A. Co.'s policy is issued to the several reinsuring Cos., B., C., D., E. Thus, while A. Co. is liable to the warehouseman for $50,000 in the event of a loss, the reinsuring Cos., B., C., D., E., contribute their several proportions. A. adjusts and pays; and on production of the discharge and the papers relating to the claim and its adjustment, B., C., D., E., pay their parts to A. Reinsurance by treaty is somewhat different in operation. A. Co., being desirous of transacting business in some foreign country, — say Japan, — will make arrangements with B., C., D., and E. offices, that they shall take a certain share of *every* risk undertaken by A.'s representatives, allowing so much per cent for commission and expenses. Say that each risk is divided into sixths; then it may be agreed that A. shall retain two sixths of every insurance, large or small, and B., C., D., E. one sixth each. Thus, on a $6,000 risk, A. stands to lose $2,000, and B., C., D., E., $1,000 each; and on a $300 risk, A. to lose $100, and B., C., D., E., $50 each.

In *Life* business, reinsurance is also practised, but to a more limited extent. The "limits" — or amounts retained by individual offices on single lives — range between $1,000 and $15,000. $5,000 is the commonest amount. The course of procedure is as follows: Say that F. Co., whose "limit" is $5,000 on a single life, after due investigation and medical examination, agrees to issue a policy for $20,000 upon the life of G. It must therefore, to observe its rule, reassure $15,000 with other Cos. before issuing its policy for the $20,000. Accurate copies of all the papers are made, and these are submitted to H., I., J. Cos., to whom $5,000 each is offered. Assuming these reinsurance proposals to be accepted, F. Co issues its policy to G. for $20,000, and takes policies *in the same terms* from the three reinsuring offices. When G. dies, F. pays the claim, and on presentation of proofs of the fact, and the title and the discharge, H., I., J. pay their share to F. By this means the risk is distributed, and without loss to F., because it is understood that H., I., J. shall all reinsure lives to the same extent with that Co. Thus F. ultimately gets on its books four or more lives for $20,000, instead of only one.

By law of the State of New York, passed June 7, 1879, "It is not lawful for any fire-insurance Co. organized or incorporated under the laws of this State to reinsure any risk with any person, partnership, association, corporation, or Co. which, at the date of such reinsurance, is not authorized to transact business in this State; and no person, etc., organized or incorporated under the laws of any other State or country shall reinsure any risk written or located within this State, with any person, etc., not admitted to transact business in this State . . . under a penalty of $500 for each violation."

Reissue. See PATENT.

Release, the remission of a claim or penalty; an acquittance or full discharge in law; an extinguishment of right or title; the discharge of a debtor from custody.

Relief Fire-Insurance Co., located in N. Y. City, organized in 1855. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $41,383; risks in force, $12,263,466; premiums, $72,224. Premiums received since the organiza-

tion of the Co., $4,057,135; losses paid, $1,837,072; cash dividends paid to stockholders, $471,000.

Remington Rifle. See Gun.

Remission, a forgiveness of fine, penalty, or punishment.

Remittance, a sum of money, or drafts for money, transmitted.

Remnants, the ends of pieces of linen, cloth, ribbon, etc.

Remorqueur, a French tug-boat, employed on rivers.

Render, to furnish an account. — To give up. — A sea term for passing a rope through a place.

Rendering, a kind of rough plastering.

Rendering Apparatus, an apparatus for extracting oil and lard from fatty animal matters.

Rendezvous, an appointed meeting-place for ships.

Rennet, a variety of apple. — The gastric juice or concreted milk found in the true stomach of a sucking quadruped, particularly of the calf, which is used for curdling milk. When required for this purpose it is prepared by salting in water for some weeks.

Rensselaer and Saratoga R.R. runs from Troy to Whitehall, N. Y., 72.55 m.; branch from Eagle Bridge, N. Y., to Rutland, Vt., 62.44 m.; 5 other branches, 47.63 m.; total length, 182.62 m. This Co. is located in Troy. As it now stands, it is the consolidation of the Saratoga and Whitehall; Rutland and Whitehall; Troy, Salem, and Rutland; Albany and Vermont; Glen's Falls; and Schenectady and Troy Cos., each of which maintains a formal organization. The whole system was rented in 1871 to the Delaware and Hudson Canal Co. Cap. stock (guaranteed 8 %), $6,854,100; funded debt, 1st mortgage, 7 %, $2,000,000; advances by lessors, $1,347,507. Per contra, construction, equipment, and real estate, $9,847,944; stocks and bonds in hands, $353,662.

Rent, an income. — A payment made to another for the use or occupation of house or lands.

Rentes, perpetual annuities in the French government funds.

Rentier [Fr.], a fundholder; one who has an income from an estate or invested capital.

Repeater, a watch that strikes the time by pressing a spring. — An arm which may be caused to fire several successive shots without reloading, as a revolver.

Repeating Circle, an astronomical instrument, on the principle of the sextant, for measuring angular distances.

Report, an account given of proceedings; the result of an inspection or examination made.

Repository, a depot; a name applied to several kinds of warehouses, as horse and carriage repository, etc.

Repoussé, in artistic metal manufactures, is a kind of embossing. Sheet metal is hammered up at the back, so as to produce a raised device on the front surface, which is afterwards finished by chasing. Benvenuto Cellini was a famous worker in this art, in gold, silver, and cheaper metals.

Reprisals. See Privateer.

Reps, a kind of heavy fabric of cotton and worsted, or of silk, woven with ribs, and used as sofa and chair coverings and for other upholstery purposes; also lighter fabrics similarly manufactured of silk for ladies' dresses.

Republic Fire-Insurance Co., located in New York City, organized in 1852. *Statement*, Jan. 1, 1880: Cap. stock paid up, $300,000; net surplus, $28,821; risks in force, $27,483,301; premiums, $151,758; premiums received since the organization of the Co., $5,501,513; losses paid, $3,185,590; cash dividends paid to stockholders, $539,589.

Reservoir, a pond or tank in which water is collected and preserved, in order to be conveyed through proper canals for the supply of a town. The term is also applied to any place where water is collected and preserved for the regular supply of a fountain or drinking trough, in situations where water is not naturally abundant.

Reserve, in banking, the portion of capital kept to meet current demands.

Resins, a class of inflammable substances, of vegetable origin, of which common *rosin* furnishes an example. They are solid, brittle, of a certain degree of transparency, and a color commonly inclining to yellow. When pure, they are soluble in alcohol and in oils, but not in water, in which respect they differ from gums. They are more or less acted upon by the alkalies. The most important are Rosin, Benzoin, Guaiacum, Storax, Mastic, Sandarac, Elemi, Tacamahac, Animi, Labdanum, Copal, and Lac, which are described under their respective heads. Colophany or Colophony is a name sometimes applied to rosin.

Resist, a sort of paste or mixture used in print dyeing, to keep portions white, when the fabric is dipped in the dye-vat.

Resolution, a declaration or special vote, or series of votes, passed by a public body.

Respirator, a mouth-protector of wire gauze, etc., worn by persons with delicate lungs, or for excluding smoke, dust, or other injurious matters from the lungs.

Respondentia. See Bottomry.

Rest, a name given to a surplus or guarantee fund held in reserve by a bank, to equalize its dividends, when the profits made fall below the amount required for paying the usual dividend to shareholders. — A device for supporting a piece of work in a lathe or vise.

Restaurateur [Fr.], the keeper of a restaurant, an eating-house, or refreshment saloon.

Resumption of Specie Payments. See Money.

Retail, the sale of commodities in small quantities or parcels; opposed to wholesale.

Reticulated, resembling net-work; of the form or appearance of net-work.

Reticule, a lady's small hand-bag.

Retort, an iron cylinder in a gas-works for charging with coal to convert into gas. — An apparatus for distilling. — A chemical glass vessel with a bent neck.

Retting. See Flax (page 382).

Returns, tabulated government statistics issued for general information. — Profits or receipts in business. — The figures or state of the polls at an election.

Return Ticket, a ticket by steamboat or railway, taken for the journey out and home, usually at a reduction of charge.

Revenue, the annual rents, profits, interest, or issues of any species of property belonging to an individual or to the public. — The annual produce of taxes, excise, customs, duties, rents, etc., which a nation or state collects and receives into the treasury for public use.

Revenue and **Expenditure**. The revenues and expenditures of the principal countries of the world are given under the names of each of these countries. The two following tables of the revenues and expenditures of the U. States for each of the fiscal years 1856 to 1879, prepared in the office of the Secretary of the Treasury, present a highly

interesting synopsis of the financial system of our country: —

1. Revenue.

Year.	Customs.	Internal revenue.	Direct tax.
	$	$	$
1856	64,022,863.50	....	....
1857	63,875,905.05	....	....
1858	41,789,620.96	....	....
1859	49,565,824.38	....	....
1860	53,187,511.87	....	....
1861	39,582,125.64	....	....
1862	49,056,397.62	....	1,795,331.73
1863	69,059,642.40	37,640,787.95	1,485,103.61
1864	102,316,152.99	109,741,134.10	475,648.96
1865	84,928,260.60	209,464,215.25	1,200,573.03
1866	179,046,651.58	309,226,813.42	1,974,754.12
1867	176,417,810.88	266,027,537.43	4,200,233.70
1868	164,464,599.56	191,087,589.41	1,788,145.85
1869	180,048,426.63	158,356,460 86	765,685.61
1870	194,538,374.44	184,899,756 49	229,102.88
1871	206,270,408.05	143,098,153.63	580,355.37
1872	216,370,286.77	130,642,177.72	....
1873	188 089,522.70	113,729,314.14	315,254.51
1874	163,103,833.69	102,409,784.90	....
1875	157,167,722.35	110,007,493.58	....
1876	148,071,984.61	116,700,732.03	93,798.80
1877	130,956,493.07	118,630,407.83	....
1878	130,170,680.20	110,581,624.74	....
1879	137,250,047.70	113,561,610.58	....

Year.	Public lands.	Miscellaneous.	Net ordinary receipts.
	$	$	$
1856	8,917,644.93	1,116,190.81	74,056,699.24
1857	3,829,486.64	1,250,920 88	68,965,312.57
1858	3,513,715.87	1,352,029.13	46.655,365.96
1859	1,756,687.30	1,454,596.24	52,777,107.92
1860	1,778,557.71	1,088,530.25	56,054,599.83
1861	870,658.54	1,023,515 31	41,476,299.49
1862	152,203 77	915,327.97	51,919,261.09
1863	167,617.17	3,741,794 38	112,094,945.51
1864	588,333.29	30,291,701.86	243,412,971.20
1865	996,553.31	25,441,556.00	322,031,158.19
1866	665,031 03	29,036,314.23	519,949,564.38
1867	1,163,575 76	15,037,522.15	462,846,679.92
1868	1,348,715.41	17,745,403.59	376,434,453.82
1869	4,020,344.34	13,997,338.65	357,188,256.09
1870	3,350,481.76	12,942,118.30	395,959,833.87
1871	2,388,646.68	22,093,541.21	374,431,104.94
1872	2,575,714 19	15,106,051.23	364,394,229.91
1873	2,882,312 38	17,161,270.05	322,177,673.78
1874	1,852,428.93	32,575,043.32	299,941,090.84
1875	1,413,640.17	15,431.915.31	284,020,771.41
1876	1,129,466.95	24,070,602.31	290,066,584 70
1877	976,253.68	30,437,487.42	281,000,642.00
1878	1,079,743.37	15,614,728.09	257,446,776.40
1879	924,781.06	20,585,697.49	272,322,135.83

Year.	Premiums.	Receipts from loans and Treasury notes.	Gross receipts.
	$	$	$
1856	....	200.00	74,056,899.24
1857	....	3,900 00	68,969,212 57
1858	....	23,717,300 00	70,372,665.96
1859	709,357.72	28,287,500.00	81,773,965.64
1860	10,008.00	20,776,800 00	76,841,407.83
1861	33,630.90	41,861,709.74	83,371,640.13
1862	68,400.00	529,692,460.50	581,680,121.59
1863	602,345.44	776,682,361 57	889,379,652.52
1864	21,174,101.91	1,128,873,945.36	1,393,461,017.57
1865	11,683,446.89	1,472,224,740.85	1,805,939,345.93
1866	38,083,055.68	712,851,553.05	1,270,884,173.11
1867	27,787,330.35	640,426,910 29	1,131,060,920.50
1868	29,203,629.50	625,111,433.20	1,030,749,516.52
1869	13,755,491.12	238,678,081 06	609,621,828 27
1870	15,295,643.76	285,474,496.00	696,729,973.63
1871	8,892,839.95	268,768,523.47	652,092,468.36
1872	9.412,637.65	305,047,054.00	679,153,921 56
1873	11,560,530.89	214,931,017.00	548,669,221.67
1874	5,037,665.22	439,272,535 46	744,251,291 52
1875	3,979,279.69	387,971,556.00	675,971,607.10
1876	4,029,280.58	397,455,808.00	691,551,673.28
1877	405,776 58	348,871,749 00	630,278.167.58
1878	317,102.30	404,581,201.00	662.345.079.70
1879	1,505,047.63	792,807,643.00	1,066,634,827.46

2. Expenditures.

Year.	War.	Navy.	Indians.	Pensions.
	$	$	$	$
1856	16,963,160.51	14,074,834.64	2,644,263.97	1,296,229.65
1857	19,159,150.87	12,651,694.61	4,354,418.87	1,310,380.58
1858	25,679,121.63	14,053,264.64	4.978,266.18	1,219,768 30
1859	23,154,720 53	14,690,927.90	3,490,534.53	1,222,222.71
1860	16,472,202.72	11,514,649.83	2,991,121 54	1,100,802.32
1861	23,001,530.67	12,387,156.52	2,865,481.17	1,034,599.73
1862	389,173,562.29	42,640,353.09	2,327,948.37	852,170 47
1863	603,314,411.82	63.261,235.31	3,152,032.70	1,078,513.36
1864	690,391,048 66	85,704,963.74	2,629,975.97	4,985,473.90
1865	1,030,690,400.06	122,617,434.07	5,059,360.71	16,347,621.34
1866	283,154,676.06	43,285,662.00	3,295.729.32	15,605,549.88
1867	95,224,415.63	31,034,011.04	4,642,531.77	20,936,551.71
1868	123,246,648.62	25,775,502.72	4,100,682.32	23,782,386.78
1869	78,501,990.61	20,000,757.97	7,042,923 06	28,476,621 78
1870	57,655,675.40	21,780,229.87	3,407,938.15	28,340,202 17
1871	35,799,991.82	19,431,027.21	7,426,997.44	34,443,894.88
1872	35,372,157.20	21,249,809 99	7,061,728.82	28,533,402 76
1873	46,323,138.31	23.526,256.79	7,951,704.88	29,359,426.86
1874	42,313,927.22	30,932,587.42	6,692,462.09	29,038,414.66
1875	41,120,645.98	21,497,626.27	8,384,656.82	29,456,216.22
1876	38,070,888.64	18,963,309.82	5,966,558 17	28,257,395.69
1877	37,082,735.90	14,959,935.36	5,277,007.22	27,963,752.27
1878	32,154,147.85	17,365,301.37	4,629,280.28	27,137,019.08
1879	40,425,660.73	15,125,126.84	5,206,109.08	35,121,482.39

Year.	Miscellaneous.	Net ordinary expenditures.	Premiums.	Interest.
	$	$	$	$
1856	31,794,038.87	66,772,527.64	385,372.90	1,953,822.37
1857	28 565,498.77	66,041,143.70	363,572.39	1,593,265.23
1858	26,400,016.42	72,330,437 17	574,443.08	1,652,055.67
1859	23,797,544.40	66,355,950.07	....	2,637,649.70
1860	27,977,978.30	60,056,754.71	....	3,144,120.94
1861	23,327,287.69	62,616,055.78	....	4,034,157.30
1862	21,385,862.59	456,379,896.81	....	13,190,344.84
1863	23,198,382.37	694,004,575 56	....	24,729,700.62
1864	27,572,216.87	811,283,679.14	....	53,685,421.69
1865	42,989,383.10	1,217,704,199.28	1,717,900.11	77,395,090.30
1866	40,613,114 17	385,954,731.43	58,476.51	133,067,624.91
1867	51,110,223.72	202,947,733.87	10,813,349 38	143,781,591.91
1868	53,009,867 67	229,915,088.11	7,001,151.04	140,424,045.71
1869	56,474,061.53	190,496,354.95	1,674,680.05	130,694,242.80
1870	53,237,461.56	164,421,507.15	15,996,555.60	129,235,498.00
1871	60,481,916 23	157,583,827.58	9.016,794.74	125,576,565.93
1872	60,984,757.42	153,201,856.19	6,958,266.76	117,357,839.72
1873	73,328,110.06	180,488,636.90	5,105,919.99	104,750,688.44
1874	85,141,593.61	194,118,985.00	1,395,073.55	107,119,815.21
1875	71,070,702.98	171,529,848.27	....	103,093,544.57
1876	73,599,661 04	164,857,813.36	....	100,243,271.23
1877	58,926.532.53	144,209,963.28	....	97,124,511.58
1878	53,177,703.57	134,463,452.15	....	102,500,874.65
1879	65,741,555.49	161,619,934.53	....	105,327,949.00

Year.	Public debt.	Gross expenditures.	Balance in Treasury at end of year.
	$	$	$
1856	3,614.618.66	72,726,341.57	49,108,229.80
1857	3,276,606.05	71.274,587.37	46,802,855.00
1858	7,505,250.82	82,062,186.74	35,113,334.22
1859	14,685,043 15	83,678,642.92	33,193,248.60
1860	13,854,250.00	77,055,125.65	32,979,530.78
1861	18,737,100.00	85,387,313.08	30 963,857.83
1862	96,097,322.09	565,667,563.74	46,965,304.87
1863	181,081,635.07	899,815,911 25	36,523,046.13
1864	430,572,014.03	1,295,541,114.86	134,433,738.44
1865	609,616,141.68	1,906,433,331 37	33,933,657.89
1866	620,263,249.10	1,139,344,081.95	165,301.654.76
1867	735,536,980.11	1,093,079,655.27	198,076,537.09
1868	692,549,685.88	1,069,889,979.74	158,936,082.87
1869	261,912,718 31	584,777,996.11	183,781,985.76
1870	393,254,282.13	702.907,842.88	177,604,116.51
1871	399,503,670.65	691,680,858.90	138,019,122.15
1872	405,007,307.54	682,525,270.21	134,666,001.85
1873	233,699,352.58	524,044,597.91	159,293,673.41
1874	422,065,060.23	724,698,933.99	178,833,339.54
1875	407,377,492.48	682,000,885.32	172,804,061.32
1876	449,345,272.80	714,446.357.39	149,909,377 21
1877	323,965,424.05	565,299,898.91	214,887,645.88
1878	353,676,944.90	590,641,271.70	286,591,453.88
1879	699,445,809.16	966,393,692.69	386,832,588.65

Revenue-Cutter, a small, swift, well-armed government vessel employed to prevent smuggling, and the unlawful clearance of vessels, and generally to assist the officers of the revenue.

Revenue Officer, one of the government officers in the service of the customs or internal revenue, acting by authority and under the direction of the Secretary of the Treasury.

Reverberatory-Furnace, a furnace in which the heat is applied to the body heated, by a flame playing on its surface.

Revere Fire-Insurance Co., located in Boston, Mass., organized in 1875. *Statement*, Jan. 1, 1880: Cap. stock paid up, $200,000; net surplus, $9,643; risks in force, $10,075,849; premiums, $123,436. Premiums received since the organization of the Co., $427,447; losses paid, $162,947; cash dividends paid to stockholders, $10,000.

Reverse, the back of a coin or medal.

Reversible-Coat, a coat which may be turned and worn either side outwards, usually of two different colors and materials.

Reversing-Gear, apparatus for making a locomotive or marine-engine move backwards.

Reversion, Reversions, or, in other words, *reversionary annuities* in property of all kinds, are frequently dealt in by insurance offices. They are bought; they are lent upon; and policies are issued to cover contingencies connected with them. Reversions are absolute or contingent. When the former, the property in question reverts unconditionally to, say B., or to his estate, on the death of A. When the latter, it also reverts to B., but, only under certain circumstances, such, for instance, as his surviving A., or surviving a third person, C., as well as A.; or A. dying in B.'s lifetime, without lawful issue. See INTEREST AND ANNUITY (page 598).

Review, a critical examination of a new book; a publication devoted to criticism.

Revise, the second proof of a sheet, taken after the corrections on the first have been made.

Revolution, the circular motion of a mill or steam-engine; the speed or power calculated by the number of revolutions per minute. — Articles of the same kind, but of different qualities, mingled together and packed in the same case; 1sts, 2ds, and 3ds cigars, when so packed, are said to be in *revolution*. — *T. McElrath.*

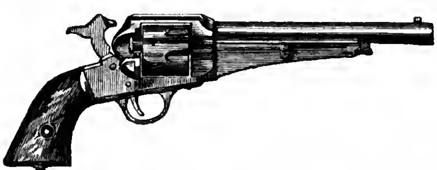

Fig. 428. — REMINGTON'S IMPROVED REVOLVER.

Revolver, a pistol with several chambers or barrels, which are brought successively under the action of the trigger or percussion arrangement, so that several shots can be fired without the necessity of reloading. The revolving pistol, as it still now exists, was patented by Col. Samuel Colt of Connecticut in 1836. It consists of one rifled barrel of considerable strength, and a massive chamber, perforated with 6 or 7 chambers, which are brought into a line with the barrel by action of the trigger. Each chamber has its nipple for a cap, which is brought under the hammer by the motion which brings the chamber or breech-piece round. The hammer is discharged by the trigger, and acts nearly horizontally in a forward direction. Under the pistol is a fixed lever-ramrod, which is used in loading the chambers. Since the expiration of Colt's patent in 1857, many varieties of the revolver have been brought out by American inventors, which all have the revolving cylinder, and are adapted to a metallic cartridge; differing from each other chiefly in the manner in which the cartridges are inserted into the chambers, and their shells ejected after they have been fired. In the Remington revolving pistol, the cartridge shell is ejected by opening the breech, as shown in Fig. 428. The annual production of revolving pistols in the U. States is about 300,000 of all sizes. The three principal manufactures are Colt's, Remington's, and Smith and Wesson's. The revolving principle has been adopted mostly in pistols; but there are also repeating or revolving rifles, with wonderful elaboration of detail. See GUN.

Revolving Cylinder Steam-Engine, one whose cylinder is mounted on trunnions, and is caused to rotate by the reciprocation of the piston, in contradistinction to the rotary engine, in which the pistons rotate on an axis within a steam-drum. — *E. H. Knight.*

Rhatany. See RATTANY ROOT.

Rhinoceros, a pachyderm animal, which is hunted for its hide and horns. The skin is so thick and coarse, that, when tanned, targets and shields made of it are almost sword and bullet proof. It is much used for making the whips or samboks of the African colonists; and of the horn, drinking cups, the hilts of swords, and other articles are made.

Rhine Wines. See GERMANY (WINES OF).

Rhode Island, one of the New England States, and the smallest State of the American Union, comprises a territory on both sides of Narraganset Bay, having N. and E. Massachusetts, W. Connecticut, and S. the Atlantic Ocean. It lies between lat. 41° 18′ and 42° 3′ N., and lon. 71° 8′ and 71° 53′ W. Greatest length N. and S., 47½ m.; greatest breadth, 40 m. Area, 1,054.6 sq. m. The area usually given in gazetteers and geographical works is from 250 to 300 m. greater, and probably includes the waters of Narraganset Bay. The State is divided into 5 counties, and has two capitals, Providence and Newport, the General Assembly holding annually its regular session in Newport, and a session by adjournment in Providence. The principal towns are Pawtucket (pop. 20,000), Woonsocket (15,000), Warwick (14,000), Lincoln (13,000), and Bristol (7,000). Pop. of the State, about 250,000.

This State on the north and west is hilly and broken, but becomes gradually level toward the sea. The islands in Narraganset Bay are distinguished by their pleasing and diversified scenery and fertile soil. The climate is healthy, particularly on the islands, where the sea-breezes have the effect not only of mitigating the heat in summer, but moderating the cold in winter, and rendering the climate truly delightful. The rivers, though not large, furnish many fine mill seats, which are extensively used for manufacturing purposes. The principal are Pawtucket, Providence, Pawtuxet, Paweatuck, and Wood Rivers. Narraganset Bay is a fine body of water, and contains a number of beautiful and fertile islands. Among them is Rhode Island, which gives name to the State. Iron ore and anthracite coal are found to some extent; marble, limestone, freestone, and other building stone. The soil is better adapted to grazing than to tillage; yet rye, barley, oats, and in some places wheat, are produced in quantities sufficient for home consumption; cider is made for exportation; artificial grasses are raised in large quantities, as, also, cattle of a superior breed; but the inhabitants, generally, have applied themselves more to commerce, the fisheries, and manufactures, rather than to agriculture. The number of acres of land in farms in

Fig. 429. — SEAL OF RHODE ISLAND.

Rhode Island, as reported by the last census, was 502,298; of which 289,030 consisted of improved lands, 169,399 of woodland, and 43,879 of other unimproved soil; the cash value of farms under cultivation, $21,574,968, exclusive of $786,246 of implements and machinery; total value of farm products, $4,761,163; of orchard stuffs, $43,036; of market gardens, $316,133; of lumber, etc., $254,683. The relative value of agricultural products for the year 1879, and the number and value of live-stock are given in this work under the names of each of the principal crops and animals. Rhode Island is one of the principal manufacturing States in the Union, more especially as regards textile fabrics. Cotton and woollen goods, leather, hardware, and machinery form her leading industrial products. Calico printing and bleaching works are carried on, too, on a most considerable scale; and the State has, besides, numerous iron foundries. There are 61 national banks in operation, whose paid-in capital is $20,009,800. There are besides 58 State and savings banks, having an aggregate paid-in capital of $3,883,267, and deposits to the amount of $50,-028,328. The funded debt of the State in 1879 was $2,534,500. The entire taxable property amounted to $328,530,559; of which $243,658,190 was real estate, and $84,872,369 personal estate. Tax per capita, $1.55. In 1879 Rhode Island had 208.12 m. of railroad, belonging to several lines, as shown in the following statement: —

Companies.	Total length of line.	Total length of line in R. I.
Boston and Providence	63.75	10.42
Fall River, Warren, and Providence	5.79	2.13
Hartford, Providence, and Fishkill	123.19	27.15
Moshassuck Valley	2.00	2.00
Narraganset Pier	8.50	8 50
Newport and Wickford	3.30	3.30
New York and New England	139.00	1.00
New York, Providence, and Boston	62.50	45.50
Old Colony	301.84	16.22
Pawtuxet Valley	3.20	3.20
Pontiac Branch	4.60	4.60
Providence and Springfield	22.80	22 80
Providence, Warren, and Bristol	13.60	13.60
Providence and Worcester	57.41	24 40
Rhode Island and Massachusetts	14.12	7.50
Warwick	8.60	8.60
Westerly Granite	1.50	1.50
Wood River	5.70	5.70

Rhode Island is divided into the three following customs districts: —

Bristol, a town, and the port of entry of the customs district of "Bristol and Warren," is situated on a peninsula between Narraganset Bay and Mount Hope Bay, 16 m. S. E. of Providence by rail. Its trade and manufactures are considerable, but it is chiefly important as a summer watering-place. Daily steamers from Providence to Fall River stop here. In 1879, 42 vessels of 30,553 tons entered, and 3 vessels of 926 tons cleared, the port in the coastwise trade. There were registered, enrolled, and licensed, 27 vessels with an aggregate tonnage of 1,803. Pop. 6,500.

Newport, one of the capitals of the State, is situated on the S. W. shore of Rhode Island, 22 m. S. S. E. of Providence, and 5 m. from the ocean, lat. 41° 29′ N., lon. 71° 19′ 12″ W. Its harbor, one of the best in the U. States, is safe, commodious, and deep enough for the largest ships. Its site is beautiful, and it is one of the most fashionable resorts in the summer season. The city is connected with Boston by the Old Colony R.R., and the daily steamers of that Co. touch here, on their way from New York to Fall River. There are some important manufactures, but, on the whole, Newport is not a commercial city. In 1879, 323 vessels, of 831,327 tons, entered, and 339, of 868,-052 tons, cleared, the port in the coastwise trade. There were registered, enrolled, and licensed, 152 vessels of 6,028 tons in aggregate. Pop. 15,000.

Providence, one of the capitals and the principal port of entry of the State, and the second city of New England in population, wealth, and manufacturing interests, is situated in lat. 41° 49′ 22″ N., lon. 71° 24′ 28″ W., 44 m. S. S. W. of Boston. Its harbor, which is at the head of Narraganset Bay, 33 m. from the ocean, is spacious, and has sufficient depth of water for the largest ships. The manufactures of Providence are of considerable importance, including cotton and woollen goods, iron, gold, and silver wares, and numerous other articles. The Gorham Company's manufactory of solid silverware is the leading silver manufactory of the world; besides which there are more than 150 establishments engaged in the manufacture of gold jewelry, which is the leading industry of the city. The Providence Tool Co. employ 1,500 men in manufacturing the Peabody breech-loading rifle, heavy and ship chandlers' hardware, and sewing-machines. The Fletcher Manufacturing Co. is perhaps the largest establishment in the world for the manufacture of small wares or notions. Besides, there must be noted the Providence Steam-Engine Co., the Allen Fire-Supply Co., the Barstow Stove Co., the Rumford Chemical Works, the Rhode Island Locomotive Works, the Corliss Steam-Engine Works, the Stove Works of Spicers & Peckham, etc. The city has 6 cotton-and-woollen mills, and is besides the head-quarters of 60 woollen and 100 cotton manufactories. The total value of its manufactures is about $55,000,000. There are 25 national banks, 9 State deposit banks, and 6 savings-banks. The foreign trade of Providence is unimportant, the imports for the year 1879 amounting to $108,452, and the exports to $14,283. In the coastwise trade 639 vessels, of 862,775 tons in aggregate, entered the port in that year. The number of vessels belonging to the port in 1880 was 126 (tonnage, 32,122). Providence is connected with the principal points of New England by several lines of railroad, and by steamers with Fall River, Newport, and various points of Narraganset Bay. There are besides a daily passenger line and a semi-weekly freight line of steamers plying to New York, and also lines of steamers for Philadelphia, Baltimore, Norfolk, and Charleston. Pop. 105,000.

Rhodes, an island in the Mediterranean, appertaining to Asiatic Turkey, near the coast of Asia Minor; lies in lat. between 35° 53′ and 30° 28′ N., lon. between 27° 40′ and 28° 12′ E. It is 40 m. long, with a breadth of 18 m. at its widest point; has an area of 440 sq. m., and is traversed by a range of mountains, on which grow forests of pine, in great request for shipbuilding. A great part of the island is uncultivated, but it yields corn, olives, pomegranates, lemons, wine, wax, honey, and figs. The manufactures are silk, shoes, red leather, and umber. Its exports are wax, honey, figs, and other fruits. Pop. 30,000. — Its capital and seaport, Rhodes, is at the N. E. extremity of the island, 13 m. S. E. the nearest promontory of Asia Minor. On the N. E. side two piers project to enclose a harbor, having in its centre from 16 to 18 ft. water, and on its N. side is another port of nearly equal depth. Pop. 15,000.

Rhodium, one of the rare metals found in platinum ores. It is very hard, white, and brittle, and one of the most infusible of metals. It is used to form the nibs of metallic pens, and also by dentists.

Rhodium Oil, an essential oil of a bitter balsamic flavor, obtained by distillation from plants of the genus *Rhodorhiza.*

Rhubarb [Chin. *ta-hwang;* Fr. *rhubarbe;* Ger. *Rhabarber;* It. *reobarbaro;* Port. *ruibarbo;* Russ. *rewen*], a medicinal root obtained from a plant, *Rheum officinalis* (Fig. 430), which inhabits the lofty mountains of Central Asia. Three kinds of it are distinguished, namely, Russian, Turkey, and Chinese or East Indian. The Russian *R.* is the best; it possesses a fine bright, reddish or whitish-yellow color, and a strong fragrant smell; and is commonly in round pieces, often perforated with so large a hole that many have the appearance of a mere rind. Turkey *R.* is derived from the same source as the Russian, but is generally darker and coarser, from less attention being paid to the trade. The Chinese or East Indian is heavier, harder, and more compact than the others, seldom perforated with holes, and is either in long pieces or with two flat sides, as if they had been compressed. The *R.* imported into this country, with the exception of a small quantity from Russia, is derived almost exclusively from China. *Imp.* free.

The *pie-plant*, or common *R.* of the gardens, *Rheum hybridum*, is a well-known plant, extensively cultivated in this country for its large succulent stalks, used in making pies, etc.

Rib, one of the timbers of a ship, which have their base in the keel as a back-bone, and serve to maintain generally the cavity of the vessel.

Ribband, in shipbuilding, one of the longitudinal bands of comparatively thin timber stretching from stem to stern at different distances from the keel. They are bolted on outside the ribs, in order to preserve the proper curvature, and to impart stability to the vessel while yet in skeleton.

Ribbon, RIBAND [Fr. *ruban de soie;* Ger. *Band;* It. *nastro di seta;* Sp. *cinta de seta*], a name given to silken bands of various widths and colors, much used by females for head-dresses and other purposes. They are both plain and figured, and are sometimes distinguished into *sarcenet, satin, taffety, chiné, watered,* etc., according to the manner in which

Fig. 430. —MEDICINAL RHUBARB.

they are made. They are also frequently ornamented by having what is called a *pearl edge* given to them. *R.* are woven in pieces, each 36 yards in length. The finest are made entirely of the best Italian and French raw silk, and the common sorts of China, Japan, and Bengal silks. The finest and heaviest *R.* comes from the French city of St. Etienne in the department Loire, which is the principal seat of that branch of industry in the world, employing 28,000 workmen and 15,000 looms. Basle in Switzerland is the second place in importance for *R.* of medium grades, plain or simply striped. Black and plain *R.* are also extensively made at Crefeld, in Rhenish Prussia. The superiority of French *R.* partly comes from being made on hand-looms; while at Coventry, England, where about 6,000 workmen are employed in that manufacture, *R.* are made with power-looms. The manuf. of *R.* in New York City and other places in the U. States is becoming quite extensive. Useful cotton printed *R.* are now produced in England; they are very cheap and tasteful, and take printing better than silk. A mixture of silk and wool has been applied in a somewhat similar way. The Swiss are trying their skill in what are called *antophyte R.*, printed by the application of photography to the etching of zinc plates, and producing a kind of lace-pattern by this means.

Imp. duty: 60 per cent; "Bozeaux" *R.*, or cotton-edge, and cord-edge or round-edge, 50 per cent; velvet of silk and cotton, silk chief value, and velvet with cotton corded edge, 50 per cent.

Rice [Fr. *riz;* It. *rizo;* Hind. *chawl*], one of the most valuable of the cereal grasses, the *Oryza sativa* of botanists. It is raised in immense quantities in India and China, and most Eastern countries; in the West Indies and Central America; and in some of the southern countries of Europe. It, in fact, occupies the same place in most intertropical regions as wheat in the warmer parts of Europe, and oats and rye in those more to the north. Forming, as it does, the principal part of the food of the most civilized and populous Eastern nations, it is more extensively consumed than any other species of grain. It is light and wholesome, but it is said to contain less of the nutritive principle than wheat. When rough, or in its natural state in the husk, it is called *paddy*. There is an immense variety in the qualities of rice. That which is principally exported from Bengal has received the name of *cargo* rice. It is of a coarse reddish cast, but is sweet and large-grained, and is preferred by the natives to every other sort. It is not kiln-dried, but is parboiled in earthen pots or caldrons, partly to destroy the vegetative principle, so that it may keep better, and partly to facilitate the process of husking. Patna rice is more esteemed than any other sort of rice from the East. It is small-grained, rather long and wiry, and remarkably white. The produce of lands naturally or artificially irrigated is, as far as rice is concerned, from 5 to 10 times greater than that of dry land having no command of water; and hence the vast importance of irrigation in all countries where this grain is cultivated. But it is worthy of remark, that, owing to the not unfrequent occurrence of severe droughts, there is a greater variation in the crops of rice than in those of many other species of grain. Those who, like the Hindoos, depend almost entirely on it for subsistence, are consequently placed in a very precarious situation. There can be no doubt that famines are at once more frequent and severe in Hindostan than in any other country. The Carolina rice is unquestionably very superior to any brought from any part of India. Rice culture, however, has not been a very flourishing or permanently prosperous interest in this country. It occupies a very small area, being confined to the low-lying shore lands of the coasts of South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. The yield per acre varies from 20 to 60 bushels, weighing from 45 to 48 pounds when cleaned. Under favorable circumstances, as many as 90 bushels to an acre have been raised. Another variety is cultivated in this country, to a limited extent, called Cochin-China, dry or mountain rice, from its adaptation to a dry soil without irrigation. It will grow several degrees further N. or S. than the Carolina rice, and has been cultivated with success in the northern provinces of China, Hungary, Westphalia, Virginia, and Maryland; but the yield is much less than that of the preceding, being only 15 to 20 bushels to an acre. The production of rice in the U. States, which amounted to 215,000,000 lbs. in 1840, and 187,000,000 in 1859, has much diminished since the civil war, the average annual production being now scarcely 75,000,000 lbs. Our exports of rice have decreased in a still larger proportion, from $2,569,362 in 1850 and $2,290,400 in 1857 to $35,538 in 1879. The imports for the year 1879 amounted to 70,271,247 lbs., valued at $2,011,290, of which 53,498,363 lbs. came from China, 2,054,341 from Hongkong, and 13,463,616 from England. *Imp.* duty: cleaned, 2½ cts. per lb.; uncleaned, 2 cts. per lb.

Rice-Flour, ground flour, used for puddings, etc., but of little value commercially.

Rice-Glue. See CEMENT (JAPANESE).

Rice-Meal, a name at the rice mills for a refuse obtained in cleaning rice; it consists of dust and a fine kind of meal; used as food for cattle.

Rice-Mill, a machine or mill for breaking the husk of rice between mill-stones, and removing the red cuticle.

Rice-Paper, a peculiar manufactured Chinese paper, used for painting, said to be made from the pith of *Arabia papyrifera*. It is brought in small pieces, dyed of various colors, and is used as a material for painting upon, and for the manufacture of several fancy and ornamental articles.

Rice-Starch, fecula prepared from rice, for the use of laundresses.

Richebourg. See BURGUNDY WINES.

Richmond. See VIRGINIA.

Richmond and Danville R.R. runs from Richmond to Danville, Va., 140.52 m.; branch, 11.82 m.; leased line (Piedmont R.R.), 48.60 m.; total, 200.94 m. This Co., located in Richmond, was chartered in 1847; the main line was opened in 1856. The Co. purchased in 1878 a controlling interest in the Charlotte, Columbia, and Augusta R.R. Cap. stock, $3,866,400; State loan, $508,486; funded debt, $3,623,400.

Richmond, Fredericksburg, and Potomac R.R. runs from Richmond to Quantico, Va., 80 m. This Co., located in Richmond, was chartered in 1834, and the road was completed in 1852. Cap. stock, common, $1,031,500, guaranteed, $500,500; funded debt, $878,241. Cost of road and equipment, $2,827,127.

Rick, a pile or stack of corn.

Riddle, a coarse iron-wire sieve, of different sizes, for sifting coals, lime, sand, ashes, grain, potatoes, etc.

Rider, in mining, a deposit of ore overlying the principal mineral. — In England, a commercial traveller.

Ridge-Hoe, a form of cultivator for tending crops in drills.

Ridge-Tiles, semi-cylindrical tiles for the top of a roof.

Riding-Habit, a long, loose, sweeping dress of cloth or other materials, fitting tight, however, about the upper part of the person, worn by ladies on horseback.

Riding-Hat, a hat for lady equestrians.

Riding-School, a place where horsemanship and equestrian exercises are taught.

Riding-Skirt, a long skirt worn by females when riding.

Riding-Whip, a short whip. Those for ladies are often made very elegant.

Rifle, a gun with a grooved bore, the cylinder being furrowed with spiral channels to give the ball a rotatory motion about an axis. See GUN.

Rifling is a distinct principle of marked peculiarity, whether applied to muskets or to large ordnance. A *smooth bore* denotes its own character. A *rifle* is distinguished from it by having *twisted grooves* from one end to the other of the interior of the barrel. The object is as follows: If a bullet is so shaped that it must necessarily pass into the grooves, it cannot advance along the barrel without following the twist of the grooves; it rotates on its axis while thus twisting, and this rotation makes the flight more straight and true than it would otherwise be. Three centuries and a half ago this principle was adopted in a rough kind of hand-gun made in Germany; and many inventions of analogous kind were put forth in the 17th and 18th centuries. A few troops called sharpshooters were armed with rifled muskets about half a century ago; but it was not until quite recent times that European infantry began to be regularly supplied with such arms. Delvigne, Thouvenin, Minié, Greener, Whitworth, Lancaster, Richards, Terry, Snider, and other inventors have gradually brought the system to great perfection. The number of grooves, the shape and size of the grooves, and the sharpness of twist vary greatly; and it is not yet known whether any one combination is the best, each inventor claiming excellence for his own. Lancaster's rifling is peculiar, seeing that it consists in making the bore *oval*, the oval itself twisting round in the barrel. Whitworth's is also peculiar, a *hexagon* being substituted for an oval. Large cannon are treated nearly in the same way as small arms, being rifled to obtain great range and accuracy. Very varied plans are adopted for compelling the ball and bullets to enter the grooves of rifled cannon and muskets. What is called the *shunt*, or *shunt rifling*, arises thus: If a ball exactly fitted the bore, it would be so tight that the cannon could hardly be loaded; if it does not exactly fit it, the ball will rest on the lower half of the bore, the axis of the projectile will not be coincident with that of the gun, and the shooting will be inaccurate. Sir W. G. Armstrong thereupon invented a beautiful contrivance for enabling the shot to shunt itself into the axis just before it leaves the gun. The mechanism for rifling, with or without the shunt arrangement, ranks in the highest class of our machine-lock achievements. The rifling of the barrel and the loading of the breech are two distinct matters. A rifle may either be a muzzle-loader or a breech-loader; a breech-loader may either be a rifle or a smooth bore.

Riga. See RUSSIA.

Rigging, a general name given to all the ropes employed to support the masts, and to extend or reduce the sails, or arrange them to the disposition of the wind. The former, which are used to sustain the masts, remain usually in a fixed position, and are called *standing rigging;* such are the shrouds, stays, and backstays. The latter, whose office is to manage the sails, by communicating with various blocks or pulleys, situated in different parts of the masts, yards, shrouds, etc., are comprehended in the general term *running rigging;* such are the braces, sheets, halliards, clew-lines, and brails. *Rigging the market* is a stock exchange term for enhancing fictitiously the value of the stock or shares in a company, by the directors or officers buying them up out of the funds of the association.

Rigsdaler. See DENMARK (MONEY).

Rim, the edge of anything.

Rime, the round of a ladder. — A hole or chink.

Rimer, a carpenter's tool for shaping rimes.

Rind, the skin of pork; the peel or bark of fruit, etc. The rind of oranges, of pomegranates, and some other fruits, enters into commerce.

Ring, a circlet of metal; as articles of jewelry, finger-rings and ear-rings are largely manufactured and dealt in. — The betting arena of a race-course. — The chime of a bell.

Ring-Bolt, an eye-bolt with a ring through the eye.

Ringer, a miner's name for a crow-bar.

Rio de Janeiro. See BRAZIL.

Rip, a wicker fish-basket. — To tear; to undo a seam.

Ripier, a fish-hawker or carrier.

Ripper, a tool for edging slates for roofing. — A tool for ripping seams of garments.

Ripping-Saw, a saw with a blade tapering in width from the handle.

Ripple, a kind of comb with long wire teeth, through which the flax plants pass to remove the capsules containing the linseed.

Rip-Rap, a foundation of loose stones.

Risk, chance of loss or damage. — The amount insured.

River-Craft, small vessels or boats, not seagoing-ships.

Rivet, a short piece of rod-iron passed through a hole in two overlapping plates, and hammered at the ends; the projecting heads made by the hammering bind the two plates together very tightly, especially if the rivet be hammered while red-hot. Such rivets are now used in immense numbers when sheet-iron and plate-iron are employed for tubular bridges, railroad girders, station-roofs, etc. Rivet holes are usually made by the very efficient punching machine; but it is not yet de-

cided whether punching or drilling is the better plan. When the position will admit of it, a *riveting machine* is employed to press a lever forcibly against one end of the rivet while the hammer acts upon the other; in some machines the rivet is *squeezed* into place.

Rix-Dollar, a money of account; and also a silver coin, still in use in some parts of Europe. The old rix-dollar of Prussia is 69 cents; of Bremen, 78¾ cents; of Bavaria, 75 cents.

R. M. S., the abbreviation for Royal Mail Steamer.

Road, a pathway formed through the country with more or less art and care, for facilitating the transit of individuals, carriages, etc., between different places. The laying out of improved roads, and their construction, forms an important part of the science of civil engineering. Owing to the immense development of the railroad system, roads have lost most of their commercial importance.

Road-Roller, a heavy cylinder used to compact the surfaces of roads.

Road-Scraper, a large metal hoe or machine for cleansing highways, roads, etc.

Roadstead, a place of anchorage for ships, distinguished from a harbor by being at some distance from the shore. *A good roadstead* is one protected from the prevailing winds, and from ocean swells; an *open roadstead*, one without such protection. A vessel when at anchor is called a *roader*, or *roadster*, in contradistinction to another under sail.

Roan, a kind of leather used for shoes, slippers, and common bookbinding; prepared from sheepskins by tanning with sumach. — A bay or sorrel horse marked with spots of gray, etc.

Roaster, a circular iron vessel, which revolves on a pivot, for roasting coffee berries. — A peculiar kind of calcining furnace, having a side door and small holes in the bridge to admit a current of air. — A gridiron. — A screen.

Roasting Ore, a preliminary preparation to smelting, which consists in making ridges of alternate layers of coal and iron-stone, that are kindled and left to burn slowly for some days.

Rob, a name given to the extract or inspissated juice of a fruit, as of juniper berries, etc.

Robbin, a package in which pepper and other dry goods are sometimes imported from Ceylon. The robbin of rice in Malabar weighs about 84 lbs. — The spring of a carriage. — A rope having a loop or eye at one end.

Robe, an official wrapper or loose overgarment. — A female's gown or dress. — An abbreviation for arroba.

Rochefort. See France.

Rocambole, an alliaceous plant (the *Allium scorodoprasum*) used in the northern parts of Europe for flavoring food, like the shalot.

Rochelle Salts, the tartrate of potash and soda, used in medicine as a mild aperient. *Imp.* duty, 5 cts. per lb.

Rochester, a city and port of entry of New York State, and the capital of Munroe County, on the Genesee River, 7 m. from its embouchure in Lake Ontario, and 229 m. W. N. W. of Albany. *R.* is remarkable, even in this country, for the rapidity of its growth, which increase has been owing, in part, to the advantageous situation of the city for an emporium, from its easy communication with the lakes by means of the Genesee, which is navigable to within 2 m. of the town, and with the country traversed by the Erie and Genesee canals, and by various railways, which either terminate in or pass by the town; but principally, perhaps, to its immense command of water-power, the various falls of the Genesee River within its limits amounting in all to 268 ft. in perpendicular height; it has, in consequence, many large flour-mills, and is, in fact, become the principal seat of the flour-trade of the Union. It has also a variety of other large establishments, the moving power in which is supplied, wholly or in part, by water, — such as fulling-mills, woollen and cotton factories, iron foundries, flour-mills, etc. In addition, it has extensive tanneries, manufactories of boots and shoes, furniture, agricultural implements, etc. The exports at the port of Genesee for the year 1879 were valued at $289,659; the imports at $203,595. The vessels belonging to the port are 26 in number, tonnage 4,330. Pop. 90,000.

Rochester and State Line R. R. runs from Rochester to Salamanca, N. Y., 107.56 m. This Co., located at Rochester, was organized in 1869, and the road was opened in 1878. Cap. stock, authorized, $2,500,000; paid in, $22,094; funded debt, 1st mortgage, 7% ($20,000 per mile), $2,343,560. Cost of road and equipment, $2,310,377.

Rochester German Insurance Co., a fire and fire-marine insurance Co., located in Rochester, N. Y., organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up, $200,000; net surplus, $120,072; risks in force, $21,187,542; premiums, $206,913. Premiums received since the organization of the Co., $1,308,720; losses paid, $590,161; cash dividends paid to stockholders, $111,000.

Rock-Boring is the drilling of holes by steam or water power to receive the charges for blasting. The most remarkable examples hitherto known are the boring of the Mont Cenis, Hoosac, and St. Gothard Tunnels. The perforators used in the Mont Cenis Tunnel were worked by compressed air, conveyed to a small cylinder, in which it works a piston, to the rod of which the jumper is directly attached. The air, being admitted behind the piston, impels the jumper against the rock, and the tool is then immediately brought back by the opening of a valve, which admits compressed air in front of the piston, at the same time that the air which has driven it forward is allowed to escape, communication with the reservoir of compressed air having previously been closed behind it. The whole of these movements are automatic, and they are effected in the most rapid manner, four or five blows being struck in every second, or between 200 and 300 in one minute. Several forms of *rock-drills*, or perforators, have been constructed on the same principle, and a description of one of them will give a good notion of the general principle of all. We select a form devised by Mr. C. Burleigh, of Massachusetts, which was very successfully employed in driving the Hoosac Tunnel.

The Burleigh perforator (Fig. 431) acts by repeated blows, like Bartlett and Sommeiller's, but its construction is more simple, and the machine is lighter and not half the size, while its action is even superior in rapidity and force. The Burleigh machines are composed of a single cylinder, the compressed air or steam acting directly on the piston, without the necessity of fly-wheel, gearing, or shafting. The regular rotation of the drills is obtained by means of a remarkably simple mechanical contrivance. This consists of two grooves, one rectilinear, the other in the form of a spiral cut into the piston-rod. In each of these channels, or grooves, is a pin, which works freely in their interior: these pins are respectively fixed to a concentric ring on the piston-rod. A rachet wheel holds the ring, and the pin slides into the curve, causing it to turn always in the same direction, without being able to go back. By this eminently simple piece of mechanism, the regular rotation of the drill-holder is secured. The slide valve is put into motion by the action of a projection, or ball-headed piston-rod, on a double curved momentum-piece or trigger, which is attached to the slide-rod or spindle by a fork, thus opening and shut-

ting the valve in the ascent and descent of the piston. The principal parts of the machine are the cylinder, with its piston, and the cradle with guide-ways, in which the cylinder travels. The action of the piston is similar to that of the ordinary steam hammer, with this difference, that, in addition to the reciprocating, it has also a rotary, motion. The drill-point is held in a slip-socket, or clamp, at the end of the piston-rod, by means of bolts and nuts. The drill-point rotates regularly at each stroke of the piston, making a complete revolution in every eighteen strokes. For hard rock it is generally made with four cutting edges, in the form of a St. Andrew's cross, thus striking the rock in 72 places in one revolution, each cutting edge chipping off a little of the stone at each stroke in advance of the one preceding. The jumper makes, on an average, 300 blows per minute. The following advantages are claimed for this machine: any laborer can work it; it combines strength, lightness, and compactness in a remarkable degree, is easily handled, and is not liable to get out of order.

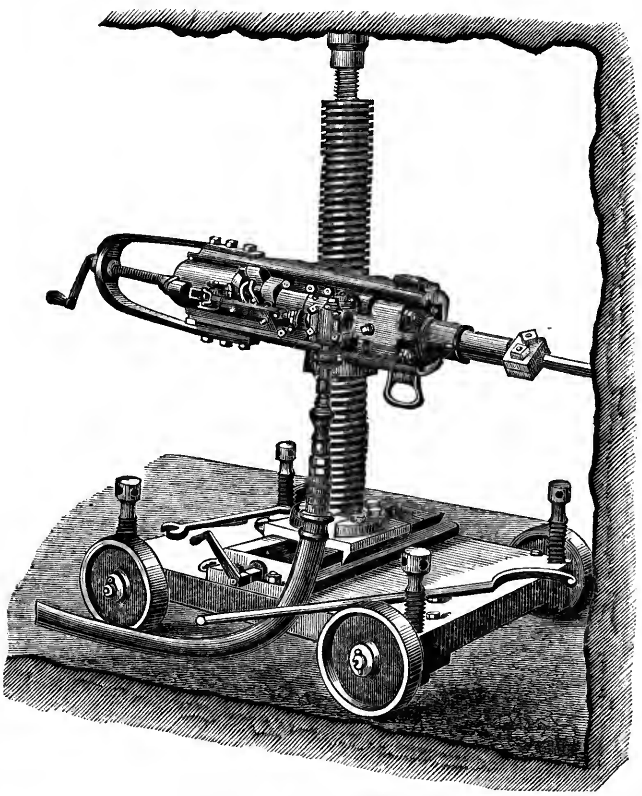

Fig. 431. — Burleigh Rock Drill.

It is applicable to every form of rock-work, such as tunnelling, mining, quarrying, open cutting, shaft-sinking, or submarine drilling; and in hard rock, like granite, gneiss, ironstone, or quartz, the machine will, according to size, progress at the incredible rate of 4 to 12 in. per minute, and bores holes from ¾ in. up to 5 in. diameter. It will, on an average, go through 120 ft. of rock per day, making 40 holes, each from 2 ft. to 3 ft. deep, and it can be used at any angle and in any direction, and will drill and clear itself to any depth up to 20 ft.

Rocket, a tube of pasteboard or of metal, filled with a mixture of saltpetre, sulphur, and charcoal, and fastened to a rod or stick. When ignited at the rear end, the forcible issue of explosive sparks drives the rocket by reaction in the opposite direction. According to the size and construction, rockets are used for war, for signals, for life-ropes, and for mere pyrotechny. When used as a life-saving apparatus, a rope or line is fastened to the rocket; and when the latter is fired from the beach towards a stranded ship, the rope may be caught by the crew, and used as a means of escape.

Rocking-Chair, a reclining or easy chair on rockers.

Rocking-Horse, a wooden horse fixed on rockers for children to ride on.

Rock Island and Peoria R. R. runs from Rock Island to Peoria, Ill., 91 m.

Rock-Oil, Rock-Tar, petroleum or mineral naphtha.

Rock-Salt, native common salt as found in mines.

Rod, a long measure of 16½ linear feet, or a sq. measure of 272¼ sq. feet.

Rod-Iron, rolled round iron for nails, fencing, etc.

Rodomel, the juice of roses mixed with honey.

Roe, the female of the hart. — The seed or spawn of fishes.

Rogome. See Cahors Wine.

Rohun Bark, the bark of the *Soymida febrifuga*, which is said to be a good substitute for cinchona. The nux vomica bark is often sold for it in the East.

Roko, a kind of small cheroot smoked by the Malays and others in the East.

Roll, a small loaf or twist; a lump of fresh butter; a twist of tobacco; a roller; any fabric rolled or folded up; 5 dozen skins.

Roller, a clod-crusher. — A heavy presser of metal or stone for levelling gravel walks or land, and smoothing grass lawns. — An inking cylinder used by printers.— In metal-working, any circular part of a machine acting as a *carrier*, as a *cutter*, as a *die*, as an *impression cylinder*, or as a *flattener*.

Rolling, the lateral oscillation of a vessel. This motion, which is often very great when the vessel is running before the sea, endangers the masts, strains the sides, and loosens the decks at the water-ways; it is also liable to cause the guns to break adrift. When the centre of gravity is too low, the oscillations begin and end violently. The changes in the stowage necessary to modify the nature or extent of the roll are made by seamen from experimental knowledge.

Rolling-Machine, a machine for making brass mouldings.

Rolling-Mill, a mill with cylinders for rolling out sheets of metal. See Iron.

Rolling-Pin, a small wooden or glass roller used by cooks to spread dough.

Rolling-Press. See Bookbinding and Copper-plate Printing.

Rollocks, Rowlocks, places cut in the gunwale of a boat for the oars to rest in while pulling.

Romal, an Indian silk fabric; English cotton handkerchiefs in imitation.

Roman-Balance, another name for the steelyard.

Roman Candle, a firework so called.

Roman Cement. See CEMENT.

Romanée. See BURGUNDY WINES.

Roman Type, the ordinary upright character of printing type; that in which this Dictionary is printed; not *italics*.

Rombowline, a sea name for condemned canvas, rope, etc.

Rome. See ITALY.

Rome, Watertown, and Odgensburg R. R. runs from Rome to Ogdensburg, N. Y., 141.11 m.; branches, 48.52 m.; Lake Ontario Division, from Oswego to Lewiston, 146.17 m.; Syracuse Division, from Sandy Creek to Syracuse, 44.50 m.; line leased (Oswego and Rome R. R.), 28.58 m.; total length of road operated, 408.88 m. This Co., consolidation of several lines in 1861, is located at Watertown, N. Y. Cap. stock, $3,147,600; funded debt, $7,749,900. Cost of road and equipment, $9,350,916. The Co. defaulted on consolidated coupons due April, 1878.

Rood, a pole; an English land measure of 5½ yards; the fourth part of an acre, or 40 sq. yards or poles.

Roofing Felt, a kind of asphalt felt cloth, imported from England. It is imported in rolls, and is much used in the construction of frame buildings and for roofing purposes.

Roof-Tree, a beam or timber for a roof.

Root-Crops, turnips, beets, potatoes, yams, and other edible roots and tubers.

Rope, a large, stout, twisted cord of hemp, of not less, generally, than an inch in circumference. A certain proportion of hemp twisted together forms a *yarn*, and a number of yarns forms a *strand*. Three strands twisted together form a *rope*. Although chain cables have nearly superseded the larger kinds of hempen cables for ships, no substance has ever yet been found better than hempen fibre for making the numerous varieties of string, twine, cordage, ropes, hawsers, etc. Every rope, whether large or small, has a continuous twisting of fibres one around another, like yarn and thread; but the number of fibres is almost indefinitely greater, and a twist in one direction often covers or envelops a twist in another. Although we are most accustomed to hemp as the material employed, yet the same mechanical system of twisting would equally make rope of the fibres of sunn, jute, flax, grass, and reeds of various kinds; hair and wool would also suffice, as well as strips of any kind of leather, hide, skin, and membrane. Rope is either *white* or *tarred*, the latter being the best if liable to exposure to wet, the former if not exposed. The strength of tarred rope is, however, only about three fourths that of white rope, and its loss of strength increases with time. Rope is designated by its circumference, expressed in inches, and is issued in *coils* of 113 fathoms each; marline and hambroline in *skeins*, spun-yarn in *pounds*; the latter is made from old rope (junk). The strength of white hempen rope may be approximately calculated by the following rule, viz.: square the circumference, and divide by five for the number of tons *dead-weight* that the rope will bear. The strain, however, caused by a sharp jerk upon a rope is very much greater than that of a dead-weight. It is stated, in this respect, that the strain upon a rope loaded with a weight of 200 pounds, and suddenly checked after a fall of 8 feet, is nearly equal to that which is caused by a dead-weight of 2 tons

The following table gives the strain that may be applied to a hempen rope with safety:—

Circum.	Pounds.	Circum.	Pounds.	Circum.	Pounds.
1.	200.	3.50	2450.	6.	7200.
1.25	312.5	3.75	2812.5	6.25	7812 5
1.50	450.	4.	3200.	6.50	8450.
1.75	612.5	4.25	3612.5	6.75	9112.5
2.	800.	4.50	4050.	7.	9800.
2.25	1012.5	4.75	4512.5	7.25	10512.5
2.50	1250.	5.	5000.	7.50	11250.
2.75	1512.5	5.25	5512.5	7.75	12012.5
3.	1800.	5.50	6050.	8.	12800.
3.25	2112.5	5.75	6612.5		

Imp. duty: bale rope of hemp, 30 per cent. — Rope of cocoanut hulls, coir, grass, or bark, or cordage untarred (see CORDAGE). — Waste rope, fit only for making paper, free.

Roqueford. See CHEESE.

Rosary, a string or chaplet of beads.

Rose, a choice garden-flower, of which there are numerous varieties, peculiarly fragrant in consequence of containing an essential oil. — A red color. — The perforated nozzle of a watering-pot.

Rose-Drop, an ear-ring. — A lozenge flavored with rose essence.

Rose-Engine, an appendage to the turning lathe, by which a surface of wood or metal, as a watch-case, is engraved with a variety of curved lines. The assemblage of these lines presenting some resemblance to a full-blown rose, is called by the French *rosette;* and hence the apparatus by which the ornamentation is produced is termed a *rose-engine.*

Rose-Leaves, petals of roses which are imported dried, or preserved in salt, for extracting the aroma or distilling into rose-water; they are also laxative. Those of the French or Provence rose are gathered before becoming quite ripe, deprived of the calyx and central attachments, and dried in the sun, or in a stove. After being sifted, in order to separate the stamens and pistils, they are gently compressed, and kept in well-closed opaque bottles or canisters. *Imp.* free.

Rosemary, a bush, the *Rosemarinus officinalis*, the tops of which yield by distillation an aromatic oil used in the preparation of cosmetics for the hair.

Rose-Pink, a delicate and fugitive color.

Roses (Oil or Essence of), ATTAR or OTTAR OF ROSES, an oil obtained by distilling the leaves of damask roses. It is limpid, of a light orange color, and has an extremely grateful and powerful perfume. This, which is the most expensive article of Oriental luxury, used to be principally made at Tunis and Ghazipore, in India. But though it is still very extensively produced at these places, and more especially at the latter, what may be called the foreign demand for the oil is now almost wholly supplied by the districts of Eski Zara and Hassanlik, in Bulgaria. There the culture of roses is carried on upon a very large scale. Inasmuch, however, as it is said to require about 300,000 roses to yield an ounce of oil, the quantity produced does not exceed 4,500 lbs. in a good, and 3,000 lbs. in an ordinary, year. The genuine article fetches an enormous price; and is in consequence very generally, or rather, we should say, uniformly adulterated. When the adulteration is effected by means of the oil of geraniums and other fine volatile oils, the fraud is not easily detected except by *connoisseurs*, unless the foreign matter be in excess. Sometimes it is alleged that the attar of roses has been sold as genuine when above 80 per cent of other oils was mixed up with it. That which is hawked about the streets of Constantinople and Smyrna is seldom anything better than olive-oil

scented with roses. Some of the more expert dealers in the article will tell within 2 per cent the foreign oil in any parcel given them to examine. *Imp.* free.

Rosewater, a liquid scent distilled from roses.

Rosewood, RHODES-WOOD [Fr. *bois de rose;* Ger. *Rosenholz;* It. *legno rodie;* Sp. *leno de rosa;* Port. *pão de rosado*] is produced in Brazil; the Canary Islands; in Siam, whence it is pretty largely exported by the Chinese; and in other places. It is in the highest esteem as a fancy wood. The width of the log imported into this country averages about 22 inches, so that it must be the produce of a large tree. *R.* has a slightly bitterish, somewhat pungent, balsamic taste, and fragrant smell, whence its name. It should be chosen sound, heavy, of the deepest color, in the largest pieces that can be procured, and of the most irregular, knotty grain. The small, light-colored, and large-shivered pieces should be rejected. The more distinct the darker parts are from the purple-red, which forms the ground, the more is the wood esteemed. It is usually cut into veneers of nine to an inch. *Imp.* free.

Rosin, the mass left after distilling the volatile oil from turpentine, forming a large article of commerce, classed with naval stores.

"When the distillation is stopped at the proper point, the product is the yellow rosin, which contains a little water; or this may be expelled, and the product is then transparent rosin. By continuing the heat the residue in the still is made brown or black, a variety which in Europe is sometimes known as colophony. Rosin melts at 276° F., and becomes completely liquid at 306°; at 316° it emits bubbles of gas, and at a red heat it is entirely decomposed. Its sp. gr. varies from 1.07 to 1.08. It is insoluble in water, but dissolves easily in alcohol, ether, wood spirit, and both fixed and volatile oils. The first portion of the liquid distillate is yellow and mobile; later, a viscid, fluorescent oil passes over, called rosin oil. At a red heat rosin yields a mixture of gases, burning with a very luminous flame, which are largely used in villages and isolated buildings instead of coal-gas. Bleached rosin is white and almost transparent, and is greatly preferred to the crude article by soap and varnish makers.—Rosin is employed for a variety of useful purposes. It is an ingredient in varnishes, and is united with tallow in the preparation of cheap candles. It answers to some extent as a substitute for fixed oil or fat in the manufacture of yellow soap; but, without glycerine in its composition, it possesses no true saponifying properties. Rosin is also used in perfumery, and in various pharmaceutical preparations, as plasters and ointments. In caulking the seams of ships it is used in a melted state to fill them, and by oakum makers it is intermixed in a pulverized state with the oakum to increase its weight. It enters into the composition of some fireworks, and is used as a reducing agent in soldering. Another well-known use of it is for covering the bows of violins, to prevent them from slipping over the strings without producing vibration. In France rosin-oil is largely used as an ingredient in printers' ink, and elsewhere in the composition of coarse lubricating oils."—*The American Cyclopædia.*—The manuf. is largely carried on in North Carolina, and, though not so extensively, in other Southern States. It is packed in barrels, sold by the lb., and is largely exported. See NAVAL STORES.

Rosolane. See ANILINE (VIOLET).

Rosolio, a red liqueur wine of the Adriatic.

Rossing Machine, a machine for removing the ross, or indurate, scaly, exterior portion of bark from the remainder.

Rostock. See GERMANY (SEAPORTS).

Rotary Motion, in mechanics, the rotation or motion of any body round an axis or centre. The velocity of this motion of bodies is proportional to their distance from such centre.

Rotary Pump, one whose motion is circular. The kinds are various; in some the cylinder revolves or rotates, as the case may be, moving in a circular path or rotating on its own proper axis. —*E. H. Knight.*

Roth. See GERMANY (WINES OF).

Rot-Steep, a weak alkaline lye used in calico-printing to remove the weaver's dressing.

Rotterdam. See HOLLAND.

Rouble, a Russian silver coin, the value of which in the United States as fixed by law is 75 cents; the U. States mint value is 79 cents 4 mills. The value of the gold coin of 5 roubles is $3.95.7.

Rouche, RUCHE, a goffered quilting of net, ribbon, blonde, or any other material.

Rouge, a scarlet powder made from colcothar, a red oxide of iron. It is used for polishing gold or silver, and known as jeweller's rouge,—[Fr. *fard*] a coloring substance extracted from safflower (*Carthamus tinctorius*). It is the only cosmetic which can be applied without injury to brighten a lady's complexion.—Liquid rouge. See CARMINE.

Rouget. See MULLET.

Roumania, an hereditary Principality, consisting of the Moldo-Wallachian provinces, formerly belonging to Turkey, but by the Treaty of Berlin recognized as an independent monarchy. The entire area is 49,262 sq. m., with a pop. of 5,376,000. The Roumanian territory includes the Dobrudscha, received from Russia in exchange for that portion of Bessarabia which was taken from Russia after the Crimean war. *Bucharest,* the capital, is situated in a hollow on the River Dimboritza, a tributary of the Danube, in lat. 44° 25′ 30″ N., lon. 26° 5′ 24″ S. The monetary business of the city is extensive,—its principal establishments being the *Bank of Roumania,* founded in 1865, with a capital of £1,000,000, and the *Société Financière de Roumanie,* with a capital of francs 6,000,000. The manufacturing industries are slight, but the trade both in foreign and native goods is of very considerable extent. Pop. 251,000.

Wallachia, the larger of the two provinces, comprises an area of 28,276 sq. m., with a pop. of about 2,900,000. The soil is among the richest in Europe, and but for the fearful summer droughts, would be also the most productive. The climate is extreme, for summer heats and winter colds are intense. The agricultural products consist of corn, maize, millet, beans, and pease. Vines and fruits of various kinds are abundant. The forests are of great extent and importance, but the riches of the country consist mainly in its cattle, sheep, and horses, of which immense numbers are reared on its far-stretching pastures. Owing to the multitude of lime-trees, bees are extensively reared. Minerals and precious metals are said to be abundant. The imports are chiefly the manufactured goods of Western Europe; the exports consist principally of wheat, barley, maize, rock-salt, and cattle.—Moldavia, the lesser of the two, has a pop. of about 2,200,000. The soil, like that of Wallachia, is fertile in the extreme, but possesses also the same drawbacks, together with great lack of cultivation; nevertheless, it produces large quantities of grain, fruit, and wine. In this large but ill-developed country, there are but 769 m. of railway open. The telegraph wires are reported to be 2,572 m.

Money, Weights, and Measures. The French decimal system of money, weights, and measures was introduced into Roumania in 1876. Unit of the monetary system is the *lei*, equivalent to the franc, divided into 100 *bani*, or centimes. Russian and Austrian coins and Turkish weights and measures are largely in use by the people.

Galatz, a seaport town in Moldavia, on the left bank of the Danube, between the confluence of the Screth and the Pruth with that river, 80 m. W. of its Sulina mouth; lat. 45° 24′ N., lon. 28° E. The Sulina mouth of the Danube forms the outer harbor for the accommodation of large ships, and the port of Galatz proper is accessible to craft of 300 tons. Wheat, maize, deal boards and timber, tallow, wool, and hides are the principal exports. The total value of imports is about $15,000,000, one third of which at least comes from England. The average number of ships clearing annually for the Black Sea is about 1,200. Pop. 80,000

Rounce, a wooden cylinder, to which is attached a belt and handle, for rolling in and out the bed or coffin of a printing-press.

Rounds, brewers' vessels in the tun-room, which are filled with beer from the fermenting squares.

Rouser, a rotating machine for stirring hops in the brewer's copper.

Roussillon (Wines of). The French department of the Pyrénées Orientales, formerly called

Roussillon, has 30,000 hectares of vine, giving about 350,000 hectolitres of wine.

The vines most cultivated at Rivesaltes are the *grenache*, *mataro*, and *crignane*, for the choicest exported wines. The *pique-pouille noir*, the *pique-pouille gris*, the *terret* and *blanquette*, give wine clear and good, but the wines destined to keep require nicety in selecting the plant. The *mataro* is the regular bearer as to quantity; the other sorts are sometimes abundant, and often scant in produce, and for the most part very irregular. Good *Grenache wine* is made in the communes of Banyuls-sur-Mer, Collioure, Port Vendres, and some in the canton of Rivesaltes. This wine is not usually suffered to ferment on the murk. If it is suffered to do so at all, it is never for more than 24 hours. The fermentation takes place in the cask, and when it is 8 or 10 years old it is soft, generous, and delicate. When it is suffered to ferment on the murk for 12 or 15 days, the wine is longer clearing itself, is more generous, and acquires in age a fine topaz color. It is ten or twelve years attaining full perfection. It then takes the designation of *rancio*, and is distinguished from the other rancio wines of *R.* by its lusciousness and particular aroma. The wines of *R.* are generally of a deep color. One kind is luscious, spirituous, and rich in aroma, and is principally for exportation. The other species is of a deep color but of less generous quality, and is consumed at home. As in other places, the same kinds of wine are of various qualities and display a difference in their taste, color, strength, according to the nature of the soil and the species of plant predominating in the vineyards where they are grown. The wines of the first quality are those grown in the communes of Banyuls, Collioure, and Port Vendres, before mentioned. At first they are of deep color and very sweet, but when aged, they take a golden hue, and gain a most delicate and agreeable taste. They have body and fineness, but they lose their deep hue in eight or ten years; hence their golden color, and title of *rancio*. They have the peculiar quality that, when once separated from their dregs, they are not liable to be spoiled, though the casks or bottles remain but partly filled. They will keep more than a century, and still gain in quality.

Roving Machine, a machine for hoisting or winding the slubbings on smaller bobbins for the creels of the spinning machine.

Row-Boat, a harbor-guard boat. — A river-police boat; a coast-guard boat keeping watch along the shore.

Rowel, the wheel of a spur. — The flat ring in a horse's bit.

Royal, a large kind of paper, 21 in. by 19; a light upper sail set above the top-gallant sail.

Royalty, a duty paid by a person who applies the patent of another, at a certain scale of compensation for each article fabricated; or, a percentage paid to the proprietor of an article by the hirer of the use of it.

Rubber, a polishing substance of various kinds, as glass and emery-paper and cloth, etc.; caoutchouc, for erasing pencil-marks; a coarse file or whetstone; a coarse towel, etc.

Rubble, in building phraseology, unhewn stone; brickbats and small stones.

Rubbles, a miller's name in some counties for the whole of the bran or outside skin of the wheat, before being sorted into pollard, bran, sharps, etc.

Ruby, a name applied by lapidaries to two kinds of precious stones essentially different. The Oriental ruby, next to the diamond the most valuable of gems, is properly a red sapphire. The other rubies are different varieties of spinel.

Ruche. See Rouche.

Rudder, the moving projecting piece or machine at the stern, by which a vessel is steered.

Ruddle, red ochre.

Rue, a common herb, the *Ruta graveolens*, which has acrid, antispasmodic properties, and is used medicinally as a stimulant and anodyne in flatulent cholic, in hysteria, and infantile convulsions.

Rüdesheimer. See Germany (Wines of).

Ruffles, puffings or wrist sleeves of lace.

Rug, a coarse woollen wrapper. — A coverlet for a bed. — An ornamental bordered square of carpet, for the front of a fireplace or hearth.

Rugging, a coarse wrapping or blanket cloth.

Rule, printers' metal reglet, or dividing lines for type, and for forming diagrams. — A workman's measure, made in size a foot, a foot and a half, or 2 feet, etc., straight or folding, in boxwood, or in ivory, and divided and ornamented. — A formal regulation laid down for guidance.

Ruler, a stick used in drawing lines, made flat or round, from 9 to 24 inches, and of different materials, usually some hard wood, as green or black ebony, etc.

Ruling-Machine, a machine constructed for ruling systematically, neatly, and speedily paper, account, and other books.

Rum, a well-known spirituous liquor, imported from the West Indies, of which it forms one of the staple products. It is obtained by means of fermentation and distillation from molasses, the refuse of the cane-juice, and portions of the cane, after the sugar has been extracted. The flavor and taste peculiar to rum are derived from the essential oils carried over in distillation. When the distillation has been carelessly performed, the spirit contains so large a quantity of the grosser and less volatile part of the oil as to be unfit for use till it has attained a considerable age. When it is well rectified, it mellows much sooner. Rum of a brownish transparent color, smooth oily taste, strong body and consistence, good age, and well kept, is the best. That which is clear and limpid, and has a hot pungent taste, is either too new, or mixed with other spirits. Jamaica and Santa Cruz rums are the first in point of quality, the Leeward Island rum, as it is called, being always inferior to it, both in flavor, strength, and value. The price of the latter is usually 20 per cent below that of the former. It is customary, in some of the West India Islands, to put sliced pineapples in puncheons of rum: this gives the spirit the flavor of the fruit, and hence the designation *pineapple rum*. Rum of inferior quality has been largely manufactured in the New England States. Any depth of color may be given to the rum by the addition of molasses or caramel, though it is commonly but erroneously stated that the color of the rum is derived from the oak casks.

Rumble, a revolving cask or shaking machine, used to clean small works of cast-iron, which soon scrub each other bright by friction. — The hind seat of a travelling carriage.

Rummage-Sale, in England, a clearance sale of unclaimed goods at the docks, or of odds and ends left in a warehouse.

Rummer, a glass drinking-vessel on a foot.

Rum-Swizzle, the name given to a fabric made in Dublin from undyed foreign wool, which, while preserving its natural property of resisting wet, possesses the qualities of common cloth.

Rundle, the step of a ladder.

Rung, a spoke; any long piece of wood.

Runlet, a small cask, which may contain an undefined quantity, usually about 14½ gallons.

Running-Days, a chartering term for consecutive days occupied on a voyage, etc., including Sundays, and not being therefore limited to working days.

Running-Rigging, the loose ropes and gear, lifts, and yards of a vessel during navigation; the standing-rigging being the shrouds, stays, etc., which secure the masts to the hull.

Running-Title, the head-line title of a book on the upper margin of each page.

Rupee, the principal coin circulating in British India. The value in the U. States of the silver rupee of 10 annas is fixed by law at 44.4 cents. See India (Money).

Rush, a common plant in all parts of the world, species of *Juncus*, several of which were formerly largely used for making mats, baskets, and the bottom of chairs, while the pith was employed for the wicks of rush-lights. See BULRUSH and DUTCH-RUSH.

Russet, in leather manufacture, the condition of leather when it is finished, excepting the operations of coloring and polishing the surface, either the *flesh* or *grain*, as the case may be, according to the purpose for which the skin is intended. — *E. H. Knight.* — A kind of reddish-brown, rough apple.

Fig. 432. — GENERAL VIEW OF THE KREMLIN (MOSCOW).

Russia, an empire comprising the whole northern portion of the eastern hemisphere, from the frontiers of Germany and the Gulf of Bothnia on the W., to the Pacific on the E.; the entire territory extending from lat. 38° to 77° 30′ N., and from lon. 17° 38′ E. to about 170° W. The government is an absolute monarchy; capital, St. Petersburg. The empire comprises: —

	Sq. Miles.	Pop.
European Russia: —		
Russia Proper (50 governments)	1,881,300	65,704,559
Poland	49,158	6,026,421
Finland	144,228	1,832,138
Asiatic Russia: —		
Caucasia (partly in Europe)	172,843	4,893,332
Siberia	4,826,480	3,428,867
Central Asia (Turkestan, etc.)	1,251,384	3,800,628
Total	8,325,393	85,685,945

In addition to the above, *R.* now possesses the portion of Bessarabia re-annexed from Roumania, 3,274 sq. m., with about 130,000 inhabitants, and the portion of Armenia annexed in 1878, 9,949 sq. m; the exact population is unknown.

The vast majority of the population of *R.* are devoted to agricultural occupations, and dwell in villages, spread thinly over the vast area of the empire. According to local enumerations made at various periods, there are but sixteen towns containing more than 50,000 inhabitants. The list is as follows: —

Towns.	Pop.	Towns.	Pop.
St. Petersburg	667,926	Kasan	78,602
Moscow	611,970	Kieff	70,591
Warsaw	251,584	Nicolaieff	67,972
Odessa	162,814	Tiflis	60,937
Kicheneff (Bessarabia)	103,998	Kharkoff	59,968
Riga	102,043	Tula	58,150
Saratoff	93,218	Berditcheff	52,786
Vilna	79,265	Samara	51,947

This empire is divided into two great parts by the Ural Mountains, which on the N. separate Asiatic from European *R.* The former is generally a vast level region, declining imperceptibly towards the Arctic Ocean, and rising gently towards its S. border, where it is lost in the immense mountain-ranges which separate it from the Chinese empire and Tartary. The N. portion of this tract is mostly a frozen desert, but the S. is generally fertile. The whole of this region, however, as well as the American territory, being but thinly inhabited by barbarous tribes, possesses as yet but little or no commercial interest; and we shall therefore principally confine our attention in the present article to the tract which lies to the W. of the Urals, embracing European *R.* and the country between the Black Sea and the Caspian, — the main body and seat of the wealth and power of the empire. — *European R.* may also be considered as one vast plain. If the Ural Mountains on its E. border, and a mountain-tract in the Crimea be excepted, there is in this immense region no part elevated more than 500 ft. above its base, or 1,100 ft. above the sea-level. That great tract of low land which begins in Northern Germany expands in *R.* to its greatest breadth, exceeding 1,200 m.; and the water-shed which divides the rivers that flow to the Baltic, Arctic Ocean, Black Sea, and Caspian, consists merely of a table-land in the N. E. parts called the Uwalli and Valdai Hills, whose declivities form long and generally imperceptible slopes. The most fertile region traverses the central part N. E., from between lat. 48° and 52° on the W. to between 53° and 56° N., on the E.; and lies between lon. 25° and 50° E. Farther N., the country is for the greater part covered with forests or bogs, until we arrive at the shores of the White Sea or Arctic Ocean, where it is mostly a swampy desert, particularly towards the N. E., between the Urals and the river Mezen, the region of the *tundras*. The fertility also decreases to the S. of the central region, especially where it lies contiguous to the *steppes*

of Southern *R.* and of the river Volga, which are vast plains, formed chiefly of sand, and destitute of wood except here and there a stunted birch. — *The climate* of *R.* is much colder than that of other European countries in the same latitude; and the farther we proceed E. the temperature becomes still lower, arising from the dreary, uncultivated surface of the land, its distance from the ocean, and the vast regions traversed by the N. and E. winds. The summer heat of *R.*, however, is in general greater than in other countries under the same parallels. The provinces which border on the Baltic and on the White Sea have a wet climate; and this feature extends to the elevated tract which borders the basin of the Volga, on the N. and W. Farther E. the rain decreases in quantity; and the S. districts have a dry climate. — *The vast forests* of *R.*, occupying an area of 500,000,000 acres, constitute one of its most remarkable features, and a principal source of wealth; the timber, tar, pitch, and ashes derived from them forming staple exports. — *The rivers* of *R.* are usually divided into five groups or systems, corresponding to the seas in which they have their embouchure, viz., the Arctic Ocean, the Baltic, the Black Sea, the Caspian, and the Pacific Ocean. The first division is by far the largest. It comprises, in Europe, the Dwina, Mezen, and Petchora; while in Asia it includes, among a host of others, the Obi, Yenisei, Lena, and Amoor, four of the largest rivers of Asia. The rivers which fall into the Baltic, though of far greater importance in a commercial point of view, are of very inferior magnitude. The principal are the Neva, which has St. Petersburg at its mouth, the Duna, and the Niemen. The rivers which fall into the Black Sea equal those falling into the Baltic in commercial importance, and far exceed them in length of course and volume of water. Among others are the Dniester, Dnieper, Bug, Don, and Kuban. The basin of the Caspian has, however, to boast of the largest and most important of the rivers of *R.*, the Volga. This great river has its source in the government of Tver, about 180 m. S. by E. from St. Petersburg; including sinuosities, its course is about 2,400 m. It is of vast consequence to the internal navigation of the empire. The Caspian Sea also receives the Ural and the Emba. Owing to the flatness of the country through which they flow, and the vast length of their course, the rivers of *R.* are but little interrupted by cataracts, flow with a tranquil stream, and afford great facilities to internal navigation. The severity of the climate, no doubt, prevents, during a considerable portion of the year, all intercourse by water, and renders the rivers falling into the Arctic Ocean of comparatively little value. Luckily, however, the frost, which interrupts navigation, affords the greatest facilities to land travelling. The lakes, as well as the rivers of *R.*, are upon a gigantic scale. The lake of Baikal, in the government of Irkutsk, in Asiatic *R.*, is one of the most extensive in the world. In European *R.*, the lakes of Ladoga, Onega, Peipus, Timen, and Bielo Ozero, are also of great extent, particularly the first. The Duchy of Finland is almost everywhere interspersed with lakes. — *In minerals*, *R.* is rich. The Ural Mountains, which contain nearly all the mineral riches of the country, are the principal seat of mining and metallic industry; producing gold, platinum, copper, iron of very superior quality, rock-salt, marble, and kaolin, or china-clay. Silver, gold, and lead are also obtained in large quantities from the mines in the Altai Mountains. An immense bed of coal, apparently inexhaustible, has been discovered near Kharkoff, in the basin of the Donetz. — *The products* of *R.* vary with the difference of soil and climate. Cereals of every kind are raised in great abundance, chiefly in the country between the Baltic and Black Seas, which is eminently fertile. The chief cereals produced are wheat, barley, oats, buckwheat, millet, and especially rye, the staple food of the inhabitants. Hemp and flax are extensively cultivated, and, of late years, potatoes and tobacco. — With metallurgical and engineering factories, *R.* possesses many extensive manufacturing establishments, for weaving, tanning, fur-dressing, etc. Linen is largely manufactured by hand-looms, the chief operations consisting in spinning and weaving flax and hemp. Woollen and worsted stuffs, fine cloths and mixed fabrics, are also produced.

Foreign Commerce. — The commerce of *R.* with foreign countries is officially divided into trade with Europe, and trade with Asia; the former being subdivided into trade through the Baltic ports, through the White Sea ports, through the Southern ports, and over the European land frontier. The immense extent of the empire, and its ever-changing limits eastward, make it difficult to obtain exact returns of the aggregate amount of its foreign commerce, which must be partly estimated. According to official and other statements, the total value of imports in the five years, 1874 to 1878, averaged, in round numbers, $275,000,000, while the value of the exports during the same period averaged $300,000,000 per annum. The four principal articles of import during the period were raw cotton, iron and other unwrought metals, tea, and machinery of all kinds, while the staple article of export was grain and other agricultural produce. The two principal countries trading with *R.* are Germany and Great Britain. Of the imports, about 40 per cent annually came from Germany, and 20 per cent from Great Britain; and of the exports 35 per cent went to Great Britain, and 20 per cent to Germany, on the average of the five years, 1874 to 1878. — The commercial intercourse is almost reduced to the importation of raw cotton from this country. For the year 1879 the imports from the U. States amounted to $16,719,984, of which, raw cotton, $15,994,764, rosin, $184,805; petroleum, $337,414; and tallow, $58,673. The exports to this country were valued at $662,750, of which, flax, $338,457; and wool, $233,177. The following table exhibits the imports from, and exports to, the U. States for 20 consecutive years from 1860 to 1879: —

Year.	Imports from the U. States.		Exports to the U. States.	Total Imports and Exports.
	Domestic.	Foreign.		
1860	$2,754,182	$79,143	$1,557,868	$4,391,193
1861	771,462	89,725	1,310,669	2,171,856
1862	153,471	80,628	641,242	875,341
1863	119,080	55,270	988,966	1,163,316
1864	395,991	77,037	1,657,821	2,130,849
1865	454,653	120,320	1,365,372	1,940,345
1866	2,632,042	50,100	1,170,651	3,852,793
1867	2,033,602	69,071	1,668,563	3,771,236
1868	2,302,353	64,764	2,274,085	4,641,202
1869	4,296,659	23,836	1,181,154	5,501,649
1870	4,180,639	13,721	1,581,637	5,775,997
1871	6,777,442	26,366	1,462,901	8,266,709
1872	6,917,709	4,076	1,965,393	8,880,178
1873	11,764,256	20,545	2,212,293	13,997,094
1874	10,284,803	15,937	1,257,170	11,557,910
1875	11,481,758	2,379	1,399,759	12,883,896
1876	11,922,285	1,548	1,112,152	13,035,985
1877	4,423,661	769	618,534	5,042,964
1878	11,100,249	6,682	671,320	11,778,251
1879	16,719,984	5,479	662,750	17,388,213

Shipping. — The commercial navy of *R.* consisted, at the end of the year 1878, of 2,512 sea-going vessels, of an aggregate burthen of 260,504 ship last, or 521,008 tons. The total comprised 621 ships engaged in trading to foreign countries, and 1,672 coasting vessels, many of them belonging to Greeks, sailing under the Russian flag. Not included in the return were 385 trading steamers on the rivers and lakes of the empire, very nearly two thirds of the number on the river Volga and its affluents.

Railroads. — The internal commerce of the empire, as well as its foreign trade, has been greatly extended by the establishment, in recent years, of a comprehensive network of railroads. The progress of railroad construction in *R.* is shown in the following table which gives the length of lines opened down to 1878:—

Years.	Versts.	English Miles.
1838 to 1865	3,578	2,385
1866 " 1870	6,514	4,343
1871 " 1875	7,606	5,071
1876 " 1877	2,412	1,615
Total	20,199	13,414

Revenue and Public Debt. — The public revenue of the empire, which is about $400,000,000, is derived to the extent of two thirds from duties and indirect taxes, while nearly two thirds of the total expenditure are for the army and navy, and interest on the public debt. — The entire public debt of *R.*, interior and foreign, was estimated to amount to 2,450,000,000 roubles, or $1,750,000,000, on the 1st of Sept., 1878, the total including an internal loan of 210,000,000 roubles, or $150,000,000, issued in 1877, soon after the commencement of the war against Turkey, and another internal loan, called "The Second Eastern Loan," to the amount of 300,000,000 roubles, or $214,285,000, issued in August, 1878. The cost of the war against Turkey, for which these loans were raised, was estimated officially, at the end of June, 1878, — but probably under-estimated to a considerable amount, — at 910,000,000 roubles, or $650,000,000. Not included in the debt here enumerated is a very large quantity of paper money with forced currency. According to official reports, the total amount of bank-notes in circulation on the 1st of Jan., 1876, was 797,313,480 roubles, or $565,223,915. There were new issues of paper money to a very large amount during the war with Turkey, variously estimated at from 205,000,000 to 280,000,000 roubles, or from £28,000,000 to $200,000,000. The destruction of public credit, through an unlimited issue of paper money, is of old standing. In the reign of Catherine II., the first attempt, on a large scale, was made to cover the annual deficits by a very liberal supply of paper roubles, the sum total of which at the death of the Empress, 1796, amounted to 200,000,000. During the subsequent wars with France and Turkey, new emissions of paper followed, with the consequence that in 1815 the notes

had fallen to 418, that is, one silver rouble was worth four roubles, eighteen copecs in paper. Great efforts were now made by the Government to improve this state of things, by withdrawing a portion of the paper from circulation. After ten years of improved financial management, there remained, however, still 600,000,000 of notes, circulating at the rate of three paper roubles to one silver rouble. As a final remedy, the Imperial Government withdrew, in 1843, the whole of the old paper money, introducing, in its stead, a new form of bank notes, with forced currency. By these and other means, particularly the establishment, in 1859, of a State bank, the Bank of *R.*, under the control of the Minister of Finance, the nominal value of the paper money was considerably raised, with a prospect of the resumption of specie payments in the course of a number of years.

Money. — The *silver Rouble* of 100 copecs = \$0.74.8. The silver rouble is the legal unit of money in *R.*, and must contain as such 278 grains, or 4 *Zolotnicks* and 21 *Doleys*, of fine silver. In actual circulation there is little else but paper money, discounted at from 10 to 20 per cent below its nominal value.

Weights and Measures: —

The *Berkowitz*	=	360 lbs. avoirdupois.
" *Pood*	=	36 " "
" *Chetvert*	=	5.77 imperial bushels.
" *Oxhuft*	=	58½ wine gallons.
" *Anker*	=	9¾ " "
" *Vedro*	=	2¾ imperial gallons.
" *Arsheen*	=	28 in.
" *Dessiatine*	=	2.702 English acres.
" *Ship Last*	=	2 tons.
1 *Pound*	=	$\frac{9}{10}$ of a pound English.
1 *Pood*, or 40 lbs. Russian	=	36 lbs. English.
63 *Poods*	=	1 ton.
1 *Tchetvert*	=	$\frac{7}{10}$ of imperial quarter.
100 *Tchetverts*	=	70 quarters.
1 *Verst*	=	3,500 ft. or ⅔ of a mile.

Since 1831 the English foot of 12 inches, each inch of ten parts, has been used as the ordinary standard of length measures.

Baltic Ports.

Cronstadt or *Kronstadt*, a strongly fortified seaport town, and the great naval station of the Russian fleet in the northern seas, on the Island of Kotlin, near the head of the Gulf of Finland, 20 m. W. of St. Petersburg, of which it is the chief port, in lat. 59° 59′ 30″ N., lon. 29° 46′ 30″ E. The island divides the approach by sea to St. Petersburg into two channels; that on the N. side is obstructed by shoals which extend across it through Kotlin to Lisiness on the mainland, and is only passable by vessels drawing less than 15 feet; the S. channel, the highway to the capital, is narrowed by a spit which projects from opposite Oranienbaum on the mainland, and, lying close to Cronstadt, has been strongly guarded by batteries. Almost all vessels bound for St. Petersburg touch at Cronstadt, and those drawing more than 8 or 10 feet of water load and unload here, the goods being conveyed to and from the capital in lighters. A canal in progress of construction will, however, be soon completed. The western or merchant harbor, which is capable of containing 1,000 ships, is ice-bound from November till April; but in other months about 3,000 vessels enter and clear. Pop. 45,115.

Riga, the cap. of Livonia, lies in lat. 56° 57′ N., lon. 24° 6′ E., on the Düna, about 7 m. from its embouchure, and 300 m. S. W. of St. Petersburg. The port is spacious; the river is also wide; but, having a bar, vessels drawing more than 12 or 13 feet have to load and unload the whole or a part of their cargoes at Bolderaa, on its outside. There are in Riga and vicinity nearly 100 manufactories of woollen, cotton, and other goods. The registered shipping is about 100 vessels, about one fourth steamers. Pop. 102,043.

St. Petersburg, the magnificent capital of the empire, is situated in lat. 59° 56′ N., lon. 30° 19′ E., on the banks and islands of the Neva, near its mouth, at the E. extremity of the Gulf of Finland. It excels all the other cities in manufactures and commerce, chiefly since the opening of the Finland and Baltic roads, and though its navigation is closed by frost generally from Nov. until May, about 3,000 vessels arrive and depart annually. In 1875 the docks were connected by rail with Moscow and other cities. Pop. 667,926.

Port on the White Sea.

Archangel is situated on the Dwina, 30 m. from its mouth, in lat. 64° 32′ N., lon. 40° 44′ E. It is a place of considerable trade, from its position on the Dwina, a river which, besides its own lengthened course, is connected by canals both with the Volga and the Neva. Its navigation is generally open from the latter part of May to the middle of October. Exports, chiefly rye, oats, timber, flax, hemp, iron, mats, linseed, potash, tallow, tar, pitch, train-oil, furs, canvas, coarse linen, cordage, and hair. Imports, tropical products, salt, woollens, cottons, hardware, and herrings. Pop. 19,936.

Port on the Caspian.

Astrakhan lies on a small island in the Volga, 30 m. from its embouchure, in lat. 46° 21′ N., lon. 48° 5′ E. It is the centre of the extensive fisheries carried on in the Volga and Caspian. The fish taken are chiefly sturgeon, carp, and seal, particularly the first; and above 30,000 barrels of caviare, prepared from sturgeon roes, have been exported in a single year. Astrakhan is also the great entrepôt of the trade with Persia and the countries east of the Caspian, transmitting (chiefly through Armenian merchants) leather, furs, iron, copper, and tallow, in exchange for silks, cottons, raw silk, drugs, and carpets. Pop. 50,000.

Ports on the Black Sea and Sea of Azof.

Odessa lies on the N. coast of the Black Sea, between the mouths of the Dniester and Dnieper, lat. 46° 28′ N., lon. 30° 43′ E., in a fine bay, with sufficient depth almost to the shore for the largest vessels, and an inner harbor capable of accommodating 300 vessels at the quays has been formed by two moles. Odessa, from its advantageous situation, is the great emporium of the produce of S. Russia destined for exportation, and its prosperity has been lately much increased by railway communication with Moscow and by numerous steamboat lines. Its exports consist mainly of grain, tallow, timber, and wool. Pop. 162,814.

Taganrog lies in the N. E. part of the Sea of Azof, in lat. 47° 12′ N., lon. 38° 56′ E. Its roadstead is so shallow that even ships of moderate burden require to be lightened at Kertsch or Feodosia; and its navigation is generally stopped by ice from Nov. to March. Still, its advantageous situation for intercourse between the provinces on the Don and the Donetz and foreign countries, and its vicinity to the Volga and the Caspian, render its trade very considerable. Exports, corn, principally wheat; with tallow, hides, cordage, linens, iron, and hardware from Tula, copper, wax, and caviare. Pop. 25,027.

Russia Iron, iron made in Russia. The bar-iron of Russia, made with charcoal for fuel, ranks with the very best iron which is produced; and the sheet-iron, which in this country is generally simply denominated Russia iron, for strength, polish, and beauty of manufacture, has not been equalled anywhere in Europe or America. The process of making it is not, as many suppose, a secret, but its excellence is due to the high character and purity of the iron employed in the manufacture, and its toughness and flexibility to the skilful manipulations of refining and annealing. The bright glossy surface is said to be produced by passing the hot sheets, moistened with a solution of wood-ashes, through polished steel rollers. —*T. McElrath.*

Russia Leather [Fr. *cuir de Russie;* Ger. *Juften;* It. *cuojo di Russia;* Sp. *muscovia;* Russ. *juft, youft*], the tanned hides of oxen and other kine denominated by the Russians *youfts*, or *juffs*, — a designation said to be derived from their being generally manufactured in pairs. The business of tanning is carried on in most towns of the empire, but principally at Moscow and St. Petersburg. Russia leather is soft, has a strongly prominent grain, a great deal of lustre, and a powerful and peculiar odor. It is principally either red or black: the former is the best, and is largely used in this and other countries for binding books, and making articles where a fine durable leather is required. The black is, however, in very extensive demand in Russia, large quantities being made up into boots and shoes. The leather acquires its powerful odor from an empyreumatic oil used in its manufacture, obtained from the bark of the birch tree. It is now made in Paris, where only goat and sheep skins are employed for the purpose. One of the best tests of genuine Russia leather is its throwing out a strong odor of burnt hide upon being rubbed a little.

Rust, a hydrous red oxide formed on iron when exposed to a moist atmosphere. To prevent the rusting of iron utensils, oil, paint, varnish, plumbago, grease, or any substance which will protect the metal from the moist air, may be employed. Under all ordinary circumstances, iron decomposes water, abstracts the oxygen, and combines with it, thus forming rust.

Rustic, a variety of ornamental printing-type, in imitation of stems and branches of trees.

Rustic Chair, a seat of twisted wood, etc., for a garden or shrubbery.

Rut, the track or furrow made by a wheel.

Ruta-Baga, a name for the Swedish turnip, the *Brassica campestris ruta baga.*

Rutgers Fire-Insurance Co., located in New York City, organized in 1853. *Statement:* Cap. stock paid up, $200,000; net surplus, $175,334. Risks in force, $13,687,227; premiums, $71,182. Premiums received since the organization of the Co., $2,143,812; losses paid, $797,595; cash dividends paid to stockholders, $764,000.

Rutile, an oxide of titanium, of variable color, used in painting porcelain.

Rye [Fr. *seigle;* Ger. *Roggen, Rocken;* It. *segala;* Sp. *centero*], the seed of *Secale cereale*, one of the most important species of cereals, little used in Great Britain for food, but forming a principal article of subsistence in the north of Europe and Flanders, generally mixed with wheat, and sometimes with barley. It is largely raised in the U. States, where the grain is made into horse-feed, and also used for manufacturing into whiskey. The New England brown bread consists of rye meal mixed with Indian corn meal. The bread made from rye has a very dark color, and its taste and odor are to some disagreeable; it is light and wholesome, but less nutritious than wheat bread. The cultivation of rye does not differ from that of wheat; its straw is used for bedding, for horse-collars, etc. Rye is also valuable as a green-fodder crop. Our exports of rye in 1879, chiefly to Belgium, Holland, and Germany, were 4,851,715 bushels, valued at $3,103,970; flour, 4,351 bbls. valued at $15,113. The following table exhibits the product, acreage, value per bushel, and total value of the rye crop for the year 1879 in each of the U. States:—

States.	Aggregate product, bush.	Acreage.	Average value per bush.	Total value.
Maine	42,400	2,650	$.87	$36,888
New Hampshire	39,600	3,300	76	30,096
Vermont	83,420	4,300	70	58,394
Massachusetts	446,340	25,800	62	276,730
Rhode Island	21,450	1,650	58	12,441
Connecticut	443,040	31,200	85	376,584
New York	3,774,000	222,000	58	2,188,920
New Jersey	564,740	37,400	60	338,844
Pennsylvania	3,777,620	245,300	84	3,173,200
Delaware	14,500	1,000	62	8,990
Maryland	370.840	25,400	53	196,545
Virginia	473,200	52,000	57	269,724
North Carolina	354,410	42,700	66	233,910
South Carolina	38,500	7,000	1.13	43,505
Georgia	....	....	....	....
Florida	....	....	....	....
Alabama	....	....	....	....
Mississippi	....	....	....	....
Louisiana	....	....	....	....
Texas	54,000	3,000	72	38,880
Arkansas	51,040	4,400	82	41,852
Tennessee	470,400	39,200	61	286,944
West Virginia	361,200	25,800	53	191,436
Kentucky	963,960	83,100	53	510,898
Ohio	1,263,800	71,000	51	644,538
Michigan	285,600	16,800	48	137.088
Indiana	435,000	30,000	51	221,850
Illinois	2,511,000	155,000	41	1,029,510
Wisconsin	3,551,200	193,000	41	1,455,992
Minnesota	176,800	8,000	41	72,488
Iowa	431,600	26,000	35	151,000
Missouri	732,000	48,800	41	300,120
Kansas	2,470,400	128,000	31	765,824
Nebraska	1,432,500	75,000	24	343,800
California	195,000	13,000	75	146,250
Oregon	13,230	900	72	9,525
Nevada, Colorado & the Territories	....	....	....	....
Total	25,842,790	1,622,700	....	13,592,826

Rynd, a piece of iron that goes across the hole in an upper millstone.

Ryot, a peasant in the East; an Indian cultivator of the soil.

S

S stands as an abbreviation for *south*, and *s* for *shilling*.

Sable [Fr. *zibeline;* Ger. *Zobel;* It. *zibellino;* Russ. *sobol*], the fur-skin of the marten, especially of the Russian marten. See FUR.

Sabot, a wooden shoe. — An iron cap. — A skid. — A break.

Sabre, a long, heavy sword for cavalry use.

Sacatillos, a Spanish name for the dried carcases of the cochineal coccus, which perishing on the plant, and yielding but little dye, are comparatively valueless.

Saccharilla, a kind of muslin.

Saccharine, sweet, relating to sugar.

Saccharometer, a variety of hydrometer used in the process of brewing, in order to ascertain the density of the liquid extracted from malt. The same instrument is used to indicate the degree to which the juice expressed from the sugar-cane is concentrated previously to undergoing the process of crystallization.

Sachet, a scent-bag, or perfume cushion.

Sack, a general name for a large bag, serving as a measure of capacity for grain and dry goods, which is common to all the languages of Europe, and some of those of Asia; a dry-measure of varying capacity, according to the article and country. The minimum sack of France is 2.012 bushels; the maximum, 4.256 ditto. The sack at Brussels is as much as 6.90 bushels. The American sack of salt, 215 lbs. The miller's sack of wheat in the U. States is 2 bushels. A sack of wool in England is 2 weys or 13 tods, = 364 lbs; of flour, corn, or meal, 280 lbs., or 2 cwt. 2 qrs. net; but the foreign sacks of flour imported are very irregular in size, varying from 140 to 200 lbs. See CANARY WINE.

Sackcloth, SACKING, a coarse kind of hempen or flaxen fabric used for bagging or baling.

Saddle [Fr. *selle;* Ger. *Sätt;* It. *sella;* Sp. *silla*], a leather seat adapted to horse's backs, for the convenience of the rider.

Saddle-Cloth, a rug put under a saddle on a horse's back.

Saddlery constitutes, with *Harness-making*, a particular branch of trade, in which leather is by far the most important material employed. The leather having been prepared by the tanner and currier, the work then consists chiefly in cutting and sewing of various kinds. A saddie has, however, a wooden frame or foundation, the leather portions being called the *skirts, seat, girth, stirrup strap*, and *crupper loop*. The seat is of pig-skin. The making of horses' collars (which are stuffed with straw) is a difficult part of harness-work. Saddles and harnesses are made in all parts of the U. States; the city of Newark, N. J., is, however, the great centre of this manufacture. The sale of *saddlers' hardware* (buckles, rings, bridle-bits, and other metal-work used by saddle and harness makers) is an important and distinct branch of trade in New York City. *Imp.* duty: saddlery and hardware, n. o. p. f., 35 per cent.

Saddle-Tree, the frame-work of a saddle, usually made of wood.

Sad-Iron, a tailor's flat-iron or goose, used, when heated, for smoothing cloth, and made of the weight of ½ lb. to 10 lbs.

Safe, a strong wrought-iron box or closet, lined with hard steel plates, the interval between the two being filled with some non-conductor of heat, so as to render them proof, or as nearly so as possible, against fire and burglars. American safes have acquired great celebrity, and their construction forms an important branch of our national industry. Safes and locks are now made to defy opening by any manipulation, and even by means of gunpowder. There are safes of various kinds for different purposes, the best of which are familiar to every business man.

Safety-Lamp. SEE FIRE-DAMP.

Safety-Valve, a vent or valve to facilitate the escape of steam, and prevent the explosion of steam-boilers.

Safflower [Fr. *cartame, saffran bâtard;* Ger. *Safflor;* It. *zaffrone;* Sp. *azafran bastardo*], the bastard saffron, the produce of the florets of the *Carthamus tinctorius*, an annual plant growing in India, Egypt, America, and some of the warmer parts of Europe. It is not easily distinguished from saffron by the eye, but it has nothing of its smell or taste. The flowers, which are chiefly imported from the Mediterranean ports, are the only parts employed in dyeing. They yield two sorts of coloring matter: one soluble in water, and producing a yellow of but little beauty; the other is *resinous*, and best dissolved by the fixed alkalies: it is this last which alone renders *S.* valuable in dyeing; as it affords a red color exceeding cochineal in delicacy and beauty, though much inferior to the latter in durability. The color of *S.* will not bear the action of soap, nor even that of the sun and air for a long time; and, before the introduction of aniline colors, was principally employed for imitating upon silk the fine scarlet (*ponceau* of the French) and rose colors dyed with cochineal upon woollen cloth. The fine rose color of *S.*, extracted by crystallized soda, precipitated by citric acid, then slowly dried, and ground with the purest talc, produces the beautiful *rouge* known by the name of *rouge végétale*. *S.* should be chosen in flakes of a bright pink color, and of a smell somewhat resembling tobacco. That which is in powder, dark colored, or oily, ought to be rejected. *S.* is also used as a substitute or adulteration for saffron in medicine. Its seeds yield a valuable fixed oil largely imported into England, but little known in this country. *Imp.* free.

Saffron [Fr. and Ger. *Safran;* It. *zafferano;* Sp. *azafran*], a commercial name for the dried stigmata of the flowers of the *Crocus sativus*. These are picked out, dried on paper in a kiln, or by the sun, and sold either compressed into cakes, or as hay *S.* It requires the stigmata of 4,320 flowers to make an ounce of the dried *S.* This valuable drug is imported from Italy and Spain, but the latter is considered the best. When good, *S.* has a sweetish, powerful, aromatic odor; a warm, pungent, bitterish taste; and a rich, deep orange yellow color. It should be chosen fresh, in close, tough, compact cakes, moderately moist, and possessing in an obvious degree all the above-mentioned qualities. Its being of a whitish-yellow or blackish color indicates that it is bad or too old. *S.* is used in medicine. It is also employed in cookery, and is besides used to impart a yellow color to confectionery articles, liquors, varnishes, etc. *Imp.* free.

Sagapenum, a concrete gum resin, the produce of *Abrus precatorius*, a Persian plant. It is imported from Alexandria, Smyrna, etc. It has an odor of

garlic; and a hot, acrid, bitterish taste. It is in agglutinated drops or masses, of an olive or brownish-yellow color, slightly translucent, and breaking with a horny fracture. It softens and is tenacious between the fingers, melts at a low heat, and burns with a crackling noise and white flame, giving out abundance of smoke, and leaving behind a light spongy charcoal. Its medical uses are the same as those of asafœtida, but it is considered less energetic, and is but little employed.

Sage, a culinary herb, the *Salvia officinalis*, used as a seasoning in its green or dry state, and sometimes to flavor cheese. An oil is also obtained from it.

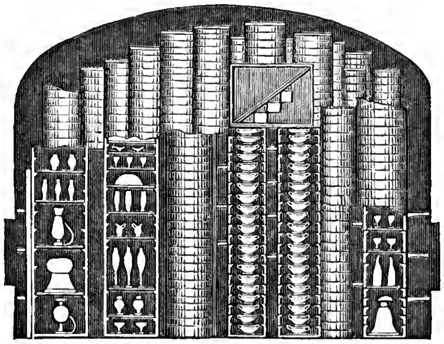

Fig. 433. — Saggars in the Kiln.

Saggar, Seggar, a crucible or clay pot for baking earthenware, shaped like a hat-box, and being piled in columns in the oven, each saggar covers the one beneath it, and protects the goods from the immediate contact of smoke and flame.

Sagging, a name applied to the bending of beams in the middle.

Sago, a well-known form of starch, obtained from the stems of various palms, particularly those of the genera *Sagus* and *Saguerus* (Fig. 434). Sago is produced chiefly in the Moluccas and in Sumatra; but it is first imported into Singapore, in very large quantities, for granulation and re-exportation. It is obtained by cutting and splitting the palm-stem, and washing it with water. The fecula subsides from the washings, and forms a powder like arrow-root, but of a dirty white color. This constitutes *meal sago*, of which 500 or 600 lbs. may be yielded by a single tree. This, when imported into Singapore, is well washed, partially dried, granulated, sifted, and roasted. The sago of commerce was formerly in grains about the size of coriander-seeds, of a reddish or brownish-white color, and mixed with some of the meal. The Chinese settled at Singapore some time since introduced their methods of refining and granulating, which gave a sago in small grains, about the size of a pin's head, hard, of a whitish or a pearly lustre, sometimes even transparent, without odor, and with very little taste. This kind is now called *pearl sago*. Sago is nutrient and demulcent, and well suited for invalids. A fictitious sago is prepared in France and in Germany with potato starch. *Imp.* free.

Saigon. See Cochin China.

Sail, an assemblage of several breadths of canvas sewed together by the lists, and edged round with cord, fastened to the yards of a ship to make it drive before the wind.

The edges of the cloths or pieces of which a sail is composed are generally sewed together with a double seam, and the whole is skirted round the edges with a cord, called the bolt-rope. Although the form of sails is extremely different, they are all, nevertheless, triangular or quadrilateral figures; or, in other words, their surfaces are contained either between three or four sides. The former of these are sometimes spread by a yard, as lateen sails, and otherwise by a stay, as stay-sails, or by a mast, as shoulder-of-mutton sails; in all which cases the foremost leech or edge is attached to the said yard, mast, or stay, throughout its whole length. The latter, or those which are four-sided, are either extended by yards, as the principal yards of a ship; or by yards and booms, as the studding-sails, drivers, ring-tails, and all those sails which are set occasionally; or by gaffs and booms, as the main-sails of sloops and brigantines.—*Sail*, is also a name applied to any vessel seen at a distance under sail, and is equivalent to ship.—*To set sail*, is to unfurl and expand the sails upon their respective yards and stays, in order to begin the action of sailing.—*To make sail*, is to spread an additional quantity of sail, so as to increase the ship's velocity.—*To shorten sail*, is to reduce or take in part of the sails, with an intention to diminish the ship's velocity.—*To strike sail*, is to lower it suddenly. This is particularly used in saluting or doing homage to a superior force, or to one whom the law of nations acknowledges as superior in certain regions.

Fig. 434. — Sago Palm.

Sail-Cloth. See Canvas.

Sailor, a hired skilled seaman; one who assists in the navigation of a ship.

Sain-doux, hogs'-lard.

Sainfoin, a fodder-grass, the *Hedysarum onobrychis*.

St. Christopher, St. Kitts, one of the British West India Islands, leeward group; lat. 17° 17′ 7″ N., lon. 60° 42′ 2″ W. Length, N. W. to S. E. 20 m.; breadth, 5 m. Area, 68 sq. m. Cap. Basseterre. Population, 24,440. The soil is particularly adapted to sugar. The exports are valued, in average, at $1,200,000; imports $1,000,000.

St. Clair, a lake between the Canadian prov. Ontario and the State of Michigan, forming the connecting link, by means of the rivers St. Clair and Detroit, between Lakes Huron, Michigan, and Erie. It is the smallest of the chain of great lakes. It is 30 m. in length, and from 12 to 20 m. in breadth. Its average depth is about 20 feet, but the principal channel used by vessels passing through it is much shallower, especially in dry seasons, when the mud of its *flats* is stirred to the

surface not unfrequently by large vessels. The chief stream which it receives from the Canadian shore is the river Thames, which is navigable for lake vessels 22 m. from its mouth, and the banks of which are exceedingly fertile, and mostly well settled. Much of the land bordering on the lake is low and marshy. In the upper part of the lake are several islands, the principal of which is Walpole Island, about 10 m. long, and from 3 to 4 m. wide.

St. Croix, Santa-Cruz, an island of the West Indies, 65 m. E. S. E. of Porto Rico, the southernmost and largest of the Virgin Islands, and the most important of the Danish provinces; length, about 25 m.; greatest breadth, 5 m.; area, 100 sq. m.; Cap. Christiansted; pop. 22,750. It is almost entirely cultivated, about half being planted with sugar cane.

St. Emilion. See Claret Wines.

St. Estephe. See Claret Wines.

St. George. See Burgundy Wines.

St. Helena, an island in the S. Atlantic Ocean, belonging to Great Britain, about 800 m. S. E. from Ascension, and nearly 1200 m. from the coast of New Guinea; lat. 15° 55′ S., lon. 5° 44′ E.; area 48 sq. m.; pop. 7,012. It is of volcanic origin, and consists of rugged mountains, interspersed with numerous ravines; in one of which, on its N. W. shore, is James Town, the residence of the principal authorities. St. Helena is chiefly noted as the place of exile of Napoleon I. The U. States have a consul resident at this island, which is frequently visited by our ships to and from Asia, India, Cape of Good Hope, etc.

St. Jago de Cuba. See Cuba.

St. John, the principal seaport and commercial metropolis of New Brunswick, Canada, at the mouth of St. John River, 190 m. N. W. of Halifax, lat. 45° 14′ 6″ N., lon. 66° 3′ 30″ W. The harbor is capacious, safe, and never blocked with ice. Its entrance, about 2 m. S. of the city, is protected by Partridge Island, on which are a quarantine hospital and a light-house. On the E. side of the channel below the town a breakwater has been constructed as a protection against southerly gales. The entrance of the river St. John into the harbor, about 1¼ m. above the city, is through a rocky gorge 90 yards wide and 400 yards long, spanned by a suspension bridge 640 feet long and 100 feet above low water. For the last five years the value of foreign imports averaged $8,000,000; exports, $4,000,000. The number of vessels belonging to the port on Jan. 1, 1880, was 814, with an aggregate tonnage of 274,618. The exports consist principally of lumber, shipped to England, the West Indies, and the U. States. St. John has numerous and important manufactures of iron-castings, steam-engines, machinery, edge-tools, nails, locomotives, cotton and woollen goods, leather, paper, etc. Its fisheries are also of considerable value. The city is connected with Bangor, Maine, by the European and North American Railway. Pop. (with suburbs) 50,000.

St. John's. See Newfoundland.

St. John's Bread. See Carob-Beans.

St. Lawrence. See Lawrence.

St. Louis, a fine and flourishing city, port of entry, and the commercial emporium of the State of Missouri, in lat. 38° 37′ 28″ N., lon. 90° 15′ 16″ W., on the right bank of the Mississippi, 18 m. below the mouth of the Missouri, nearly 1,200 m. above New Orleans, and 200 m. above the mouth of the Ohio. It is connected with East St. Louis, a city of Illinois on the opposite side of the river, by a magnificent bridge of steel, resting on four piers. The city extends about 11 m. along the margin of the river, from which the ground rises by a gentle ascent to a second plateau, about 40 ft. above the level of the first. The peculiarly fortunate location of St. Louis has caused it to grow in population with remarkable rapidity, while as a commercial and industrial centre it has already attained rank as one of the most important cities of this continent, being only surpassed by New York and Philadelphia in the number and capital engaged in its manufactures. Its flouring mills are numerous, and enjoy a high reputation; and its large sugar refineries manufacture most of the sugar consumed in the Mississippi Valley. Oils and chemicals are largely manufactured. The manufacture of hemp into bale-rope and bagging, the distillation of whiskey, and the manufacture of tobacco, occupy many hands. The packing of pork, beef, lard, and hams employs a very large capital. But the manufacture of iron exceeds any other in its extent and capital involved. As a business site, it is the centre of one of the best agricultural districts in this country, for the products of which it affords the readiest outlet, and which obtains its supplies of manufactured and other commodities, not home-raised, from and through St. Louis. Even before the development of its vast railroad system, St. Louis was recognized as a centre of trade on account of its admirable water transportation: the great Mississippi River, with its large tributaries, giving it direct communication with many thousands of miles of navigable water, and the importance of its water facilities is scarcely diminished by the development of its greater railway facilities. Fourteen trunk lines of railroad radiate from St. Louis as a centre, and with their own rails and connections place it in daily communication with all parts of the country. Among the railroads of the St. Louis system are the St. Louis and San Francisco, the Missouri Pacific, the St. Louis, Kansas City, and Northern, the Chicago and Alton, the Chicago, Burlington, and Quincy, the Wabash, St. Louis, and Pacific, the Indianapolis and St. Louis, the Illinois and St. Louis, the Vandalia Line, the Ohio and Mississippi, the St. Louis and Southeastern, the St. Louis, Alton, and Terre Haute, the Cairo and St. Louis, the St. Louis, Iron Mountain, and Southern, and others; all of those named, except the St. Louis, Iron Mountain, and Southern Railroad, use the same depot in St. Louis, and that one transfers passengers and freight from its own to the Union Depot without extra charge. The arrivals of barges and canal boats in 1879 numbered 1,471; of steamers, 2,360, viz.: from the upper Mississippi, 946; lower Mississippi, 851; Illinois River, 234; Missouri River, 132; Ohio River, 179; elsewhere, 18. The steady increase of the volume of business in St. Louis is shown in the following table of tonnage receipts and shipments by rail and river for six years: —

Year.	Receipts.		Shipments.	
	By rail.	By river.	By rail.	By river.
	Tons.	Tons.	Tons.	Tons.
1871.......	2,298,321	884,411	959,882	776,498
1875.......	3,232,770	663,526	1,301,450	639,095
1876.......	3,431,220	688,753	1,659,950	600,223
1877.......	3,464,388	644,485	1,652,850	597,670
1878.......	3,785,307	714,700	1,880,559	614,675
1879.......	4,663,078	688,970	2,285,716	677,145

Comparative Business in Leading Articles at St. Louis in 1878 and 1879: —

Articles.	1878.	1879.
Flour, amount manufactured...bbls.	1,916,290	2,142,949
" " handled......... "	3,633,872	4,154,754
Wheat, total receipts...........bush.	14,325,431	17,093,362
Corn, " " .... "	9,009,723	13,360,636
Oats, " " .... "	3,882,276	5,002,165
Rye, " " .... "	845,932	713,728
Barley, " " .... "	1,517,292	1,831,517
All grain (including flour reduced to wheat)............. "	36,107,334	46,037,578
Cotton, receipts................bales.	338,340	472,436
Hemp, " .... "	5,087	4,072
Bagging, manufactured........yards.	7,500,000	8,000,000
Hay, receipts bales of 400 lbs....bales.	330,981	461,979
Tobacco, receipts..............hhds.	25,870	20,278
Lead, rec. in pigs 80 lb. average.pigs.	764,357	817,594
Hog product, total exports......lbs.	188,529,593	220,891,273
Cattle, receipts................head.	406,235	420,654
Sheep, " .... "	168,095	182,648
Hogs, " .... "	1,451,634	1,762,224
Horses and mules, receipts..... "	27,878	33,953
Lumber, " .....feet.	189,238,333	280,986,361
Shingles, " .....pcs.	88,059,000	77,811,500
Lath, " ..... "	33,993,000	27,713,700
Wool, total receipts............lbs.	16,469,816	20,786,742
Hides, " .... "	17,129,894	20,042,734
Sugar, received................ "	106,836,225	107,176,052
Molasses, shipped.............galls.	1,844,260	1,684,960
Coffee, received................bags.	201,080	267,533
Rice, receipts..................bbls.	25,600	34,213
Coal, " ....bush.	33,087,300	36,978,150
Nails, " ....kegs.	522,399	575,538
Potatoes, receipts.............bush.	602,675	963,047
Salt, " ....bbls.	271,521	244,966
" " ....sacks.	78,781	78,345
" " ....bush. in bulk.	....	439,788
Butter.........................lbs.	8,627,056	8,961,965

The movement of grain for 10 years was as follows: —

Year.	Flour, bbls.		Wheat, bush.	
	Receipts.	Shipments.	Receipts.	Shipments.
1870........	24,313,791	21,039,776	6,638,253	636,562
1871........	26,093,336	21,587,187	7,311,910	1,048,532
1872........	28,895,912	23,885,784	6,007,987	918,477
1873........	27,243,558	22,549,739	6,185,038	1,210,286
1874........	30,673,504	24,417,411	8,255,221	1,938,841
1875........	27,260,820	20,649,147	7,604,265	1,562,453
1876........	34,198,376	28,907,601	8,037,574	2,630,007
1877........	30,835,700	25,333,588	8,274,151	2,410,190
1878........	36,107,334	29,432,435	14,325,431	6,900,802
1879........	46,037,578	33,676,424	17,093,362	7,302,076

Year.	Corn, bush.		Oats, bush.	
	Receipts.	Shipments.	Receipts.	Shipments.
1870........	4,708,838	3,637,060	4,519,510	3,144,744
1871........	6,030,734	4,469,849	4,358,099	2,484,582
1872........	9,479,387	8,079,739	5,467,800	3,467,594
1873........	7,701,187	5,260,916	5,359,853	3,215,206
1874........	6,991,677	4,148,556	5,296,967	3,027,663
1875........	6,710,263	3,523,974	5,006,850	2,877,035
1876........	15,249,909	12,728,849	3,660,912	1,932,983
1877........	11,847,771	9,309,014	3,124,721	1,550,665
1878........	9,009,723	6,382,712	3,882,276	1,792,801
1879........	13,360,636	8,311,005	5,002,165	2,154,026

Year.	Rye, bush.		Barley, bush.	
	Receipts.	Shipments.	Receipts.	Shipments.
1870........	210,542	100,254	778,518	70,451
1871........	374,336	138,756	876,217	62,843
1872........	377,587	150,208	1,263,486	87,566
1873........	356,580	206,652	1,158,615	125,604
1874........	288,743	166,133	1,421,406	227,418
1875........	275,200	134,960	1,171,337	146,330
1876........	399,826	304,192	1,492,985	223,680
1877........	472,907	397,183	1,326,490	188,251
1878........	845,932	757,621	1,517,292	244,799
1879........	713,728	423,720	1,831,507	260,422

As already stated, St. Louis stands pre-eminent in the manufacture of flour. Its millers, keeping pace with the progress of the age, and securing every patent and improvement, make the best flour produced in the U. States, and it is largely shipped to Europe, where it comes in competition, both as to quality and price, with all the celebrated flours of that continent. The production for five years was as follows: 1875, 1,486,821 bbls.; 1876, 1,441,944; 1877, 1,517,921; 1878, 1,916,290; 1879, 2,142,949. The movement of provisions for ten years was as follows: —

Receipts.

Year.	Pork, bbls.	Hams and Meats, lbs.	Lard, lbs.
1879......................	32,113	92,983,380	8,415,176
1878......................	52,200	58,611,064	7,019,741
1877......................	45,482	48,203,972	7,087,001
1876......................	45,632	50,290,716	6,067,325
1875......................	46,547	51,556,146	6,732,320
1874......................	55,453	52,104,380	6,877,560
1873......................	57,476	50,071,760	8,981,820
1872......................	60,207	63,434,860	11,288,890
1871......................	88,442	57,804,350	10,093,460
1870......................	77,398	44,494,770	6,215,150

Exports.

Year.	Pork, bbls.	Hams and Meats, lbs.	Lard, lbs.
1879......................	89,385	159,398,870	38,925,903
1878......................	112,375	125,602,088	40,452,505
1877......................	108,768	119,955,382	34,725,726
1876......................	86,141	106,803,076	29,292,879
1875......................	95,503	105,809,598	24,145,176
1874......................	90,343	133,486,380	27,112,270
1873......................	105,876	184,392,770	37,156,810
1872......................	114,329	147,141,960	33,943,860
1871......................	131,732	123,665,060	30,750,470
1870......................	115,236	77,501,130	15,507,840

The number of hogs packed for a series of five years was as follows: 1874-75, 462,246; 1875-76, 329,895; 1876-77, 414,747; 1877-78, 509,540; 1878-79, 629,261. Probably the most wonderful progress made in any branch of trade in St. Louis, in the same length of time, is in the cotton trade. From 36,421 bales, received in the season of 1871-72, the business has grown steadily, until for the past season, ending Aug. 31, 1879, the receipts reached 335,799 bales. Of this amount 304,486 bales came by the Iron Mountain railroad, 10,553 bales by the Missouri, Kansas, and Texas, and 5,004 bales by the St. Louis and San Francisco, and 15,012 bales by boats from down the river. Of the receipts by the three roads named, 149,716 bales came from Texas and Louisiana (mostly from Texas), 152,992 bales from Arkansas, 11,354 bales from Kentucky, Tennessee, and Mississippi, 3,938 from Missouri, and 2,043 from the Indian Territory. Of the total shipments, which reached 325,766 bales, 104,150 bales were shipped direct to Europe; of which 98,598 bales went to Liverpool, 4,666 bales to Havre, 550 bales to Bremen, 236 to Vienna, and 100 to New York for export. — In 1879 there were belonging to the port 375 vessels whose aggregate tonnage was 148,692. On Jan. 1, 1880, St. Louis had 5 national and 20 State banks, whose aggregate capital was $10,995,963; deposits, $29,452,858. The city has several important commercial and industrial institutions, among which are a chamber of commerce, a merchants' exchange, a board of trade, a cotton exchange, a mechanics' and manufacturers' exchange, and a mining exchange. The assessed value of real and personal property for the year 1879 was $163,813,920. Pop. about 525,000.

St. Louis, Alton, and Terre Haute R. R. runs from Terre Haute, Ind., to East St. Louis (via Alton), Ill., 189 m.; branches, 18.8 m. This Co., located in St. Louis, operates besides, under lease of 999 years, the Belleville and Southern Illinois R. R. (56.4 m.), whose accounts are kept separately. Cap. stock, 4,768,400 (common, $2,-300,000; preferred, $2,468,400); funded debt, $7,-000,000. Cost of construction, $11,768,400. The main line, extending from Terre Haute to East St. Louis, was leased in 1867, for 99 years, to the Indianapolis and St. Louis R. R. Co., at an annual rental of 30 per cent of the gross earnings of the line leased, up to $2,000,000 (but in no one year a less sum than $450,000). Upon all earnings in excess of $2,000,000 and not exceeding $3,000,000, the lessors are to receive 25 per cent; and upon all earnings exceeding $3,000,000, 20 per cent. The lease was guaranteed by the Pittsburg, Fort Wayne, and Chicago R. R. Co. for one third; the Cleveland, Columbus, and Cincinnati, and the Cleveland, Painesville, and Ashtabula R. R. Cos., jointly for one third; and the Indianapolis, Cincinnati, and Lafayette R. R. Co. for one third.

St. Louis, Iron Mountain, and Southern R. R. runs from St. Louis, Mo., to Texarkana, Texas line, 489.50 m.; branches, from Mineral Point to Potosi, Mo., 4 m.; from Bismarck to Belmont, Mo., 120 m.; and from Poplar Bluff to Bird's Point, 73 m. Total length of line, 684.50 m. This Co., located in St. Louis, is the consolidation, in 1874, of the St. Louis and Iron Mountain, the Arkansas Branch, the Cairo and Fulton, and the Cairo, Arkansas, and Texas R. R. Cos. Capital stock, $21,469,101; bonded debt, $25,909,000 (consolidated, $3,934,000; unconsolidated, $21,975,000); funded interest = certificates issued, $2,269,710. Per contra: cost of construction and equipment, $45,237,715; real estate, $656,977; value of land-grant, $3,648,608.

St. Louis, Kansas City, and Northern R. R. runs from St. Louis to North Missouri Junction, Mo., 265.48 m.; branches, 113.52 m.; leased lines, 219.80 m.; total length of lines operated, 598.80 m. This Co., located in St. Louis, was chartered in 1872, as successor to the North Missouri R. R. Co., which was sold under foreclosure in 1871. Cap. stock, $24,000,000 (common, $12,000,-000; preferred, $12,000,000); funded debt, $10,381,-500. Cost of road and equipment ($90,837.14 per mile), $34,434,244.

St. Louis, Keokuk, and North Western R. R. runs from Keokuk, Ia., to Clarksville, Mo., 90 m. This Co., located in Keokuk, is the reorganization, in July 1, 1875, of the Missouri Valley and Western R. R. Co., which was sold in April of the same year. Cap. stock, $3,645,000 (common, $2,295,000; preferred, $1,350,000); funded debt, $2,750,000.

St. Louis and San Francisco R. R. runs from Pacific, Mo., to Vinita, Ind. Ter., 327.25 m. This Co. was organized Sept. 7, 1876, as the successor of the Atlantic and Pacific R. R. Co., which was organized under an act of Congress approved July 27, 1866, and embraces the South Pacific R. R. Co. (originally the southwest branch of the Pacific R. R. of Missouri), which was organized under the provisions of an act of the General Assembly of Missouri approved March 7, 1868, and consolidated with the A. and P. R. R. Co., Oct. 25, 1870. The road was opened to Vinita, Sept. 1, 1871. The South Pacific R. R. Co. received a grant of lands, under an act of Congress passed June 10, 1852, of 1,161,205 acres. Under the Atlantic and Pacific R. R. Co.'s charter, about 500,000 acres have been already received and secured by the company: namely, 480,000 acres in Missouri and 20,000 in Arkansas. The receipts from the sales of these lands are applicable, first, to interest on the bonded debt, and the balance appropriated to paying off the bonds at a price not exceeding 110 per cent. Cap. stock, $21,642,100; funded debt, $5,292,000. The Co. is also responsible for the funded debt of the Southern Pacific R. R. Co., consisting of $7,144,500 1st mortgage 6% bonds, payable 1888. Cost of construction and equipment, $26,927,791.

St. Louis, Vandalia, and Terre Haute R. R. runs from East St. Louis, Ill., to Indiana State line, 158.3 m. This Co., located in Greenville, was chartered in 1865. The road, opened in 1870, is operated by Terre Haute and Indianapolis R. R. Co. Rental, 30 % of gross earnings. Cap. stock, $2,383,315; preferred, $1,544,700; funded debt, $4,499,000.

St. Lucia, a British island of the West Indies, the largest of the Windward group, except Trinidad, situated in lat. 13° 42′ and 14° 8′ N., lon. 60° 52′ and 61° 7′ W., 25 m. N. of St. Vincent. It is 30 m. in length, and 21 m. at its greatest breadth; area, 250 sq. m. The soil is fertile; the climate warm, damp, and unhealthy. Castries, the chief town, is on the shore of an excellent harbor, on the W. coast, 9 m. from the N. end. Pop. 35,000.

St. Malo. See FRANCE (SEAPORTS).

St. Martin. See GUADELOUPE.

St. Nicholas Insurance Co., located in New York City, organized in 1852. *Statement*, Jan. 1, 1880: Cap. stock, paid up, $200,000; net surplus, $10,841. Risks in force, $16,581,952; premiums, $127,700. Premiums received since the organization of the Co., $2,609,854; losses paid, $1,477,535; cash dividends paid to stockholders, $274,500.

St. Paul. See MINNESOTA.

St. Paul and Sioux City R. R. runs from St. Paul to St. James, Minn., 121.27 m. This Co., located in St. Paul, was chartered in 1864, and the road was opened in 1870. Cap. stock, $2,400,000; preferred stock, $2,021,696. Cost of road and equipment, $4,555,137.

St. Paul Fire and Marine Insurance Co., located in St. Paul, Minn., organized in 1865. *Statement*, Jan. 1, 1880: Cap. stock paid up, $400,-000; net surplus, $166,375. Risks in force, $38,-652,159; premiums, $493,000. Premiums received since the organization of the Co., $4,320,757; losses paid, $2,857,956; cash dividends paid to stockholders, $446,696.

St. Paul, Minneapolis, and Manitoba R. R. This Co. was organized in 1879 by the consolidation of the St. Paul and Pacific R. R. Co. and the Red River and Manitoba R. R., including branches and extension. The total length of lines owned and operated in 1880 was 667 m. The Co. own 2,000,000 acres of land, and have issued 1st mortgage 7 % sinking-fund land-grant bonds, dated July 1, 1879, and due 1909, at the rate of $12,000 per mile of completed road. Total amount provided, $8,000,000; to be issued, $6,780,-000. This is the only mortgage on the property.

St. Petersburg. See RUSSIA.

St. Thomas, a Danish Island of the West Indies, Virgin group, about 38 m. E. of Porto Rico, lat. 18° 20′ 24″ N., lon. 64° 55′ 45″ W.; area, 45 sq. m.; pop. 14,007. The soil is almost barren, climate very warm and unhealthy, hurricanes and earthquakes frequent. Notwithstanding these many drawbacks, Charlotte Amalie, a free port, and the only town on the island, built along the shore of an excellent bay on the S. side, is a

station for 8 regular steam lines, and the number of vessels of all classes which touch there is about 4,300. It owes this distinction to its port, which is one of the best in the region, being landlocked, easy of egress and ingress, and at once central to the West Indies and not far from Europe.

The port charges at St. Thomas are as follows: Vessels in ballast, $4.08 per 100 tons register. Those bringing and taking cargo pay $57.12 per 100 tons register. Those bringing only coals for the steam packet companies' or merchants' account, and leaving in ballast, pay $32.64 per 100 tons register. No charges are levied on vessels arriving in distress. There is a fixed fee on all vessels in ballast or loaded, called the "fort pass," of 80 cents for schooners, $1.28 for brigs, $2.56 for barques or ships. The import duties are 1¼ per cent on the invoice value of importation, coals being admitted duty free. Lighters without men are from $3.00 to $5.00, labor $1.25 per diem; water for shipping 1 to 2 cents per 9 gallons from water boats, free alongside of vessel. Stone ballast, 75 cents to $1.00 per ton of 2,240 lbs., British weight, free alongside of vessel. Pilotage not compulsory, but vessels signalling for a pilot pay by draught of water, $10.00 for 16 feet.

Salad, lettuces, endive, and other herbs eaten raw, dressed with vinegar, oil, and other condiments.

Salad-Cream, a prepared dressing for salads.

Salading, vegetables for making a salad.

Salad-Oil, Florence or olive-oil, usually retailed in wicker-cased flasks, for mixing with salads.

Salad - Spoon, a wooden, ivory, or other spoon, for mixing and serving salad.

Sal-Ammoniac. See Ammonia.

Sal - Volatile, a smelling salt, the carbonate of ammonia.

Salary, wages paid periodically or annually.

Sale, the exchange of a commodity for money of equivalent value, paid, or to be paid. See Mortgage.

Sale and Return, goods sent to a retail trader without order, with the understanding that what he may choose to take he shall have as on a contract of sale, and what he does not take he will retain as a consignee of the owner. — *T. McElrath.*

Sale, Bill of. See Bill of Sale.

Salem. See Massachusetts.

Salep, the farinaceous portion of the tubers of the *Orchis morio*, formerly in much repute as a diet drink, but now less used.

Saleratus, a name in the United States for prepared carbonate of soda and salt. Of this chemical product there are two kinds, one a bi-carbonate of soda, and the other of potash. Saleratus is used by bakers and housekeepers, with cream of tartar, for mixing with flour, sour milk, etc., to evolve the carbonic acid gas on the addition of water, the dough expanding in the oven, and rendering the product light and spongy. It is also used for bleaching purposes.

Salesman, a vender; a wholesale dealer, of whom there are various kinds, as butter, meat, poultry, cattle, and sheep, hide, oyster, game, fruit, hay and straw, potato and other salesmen.

Sal-Gem, a commercial name for native rock-salt or chloride of sodium.

Salicine, an alkaloid; the crystalline bitter principle of the bark of the willow, which is used medicinally as a febrifuge.

Salinometer, a salt-gauge for indicating the density of the sea-water in the marine steam-boiler, and for keeping it free from salt or incrustation, by blowing off when required.

Sallow, a name for species of *Salix*, which are not flexible like the osier, but furnish the best charcoal for gunpowder.

Salmon [Fr. *saumon;* Ger. *Lachs, Salm;* It. *salamone;* Sp. *salmon;* Latin, *salmo*]. This excellent fish [Fig. 435], is too well known to require any description. It is found only in northern seas, being unknown in the Mediterranean and other warm regions. In this country it is an article of much value and importance. The *S.* rarely bites at a hook in the sea, but rises to artificial flies in rivers and estuaries. When *S.*-fishing is pursued as a business, they are taken in gill nets stretched across the mouths of the rivers. In N. America the *S.* frequents the rivers of Labrador, Canada, Nova Scotia, New England, and those of New York communicating with the St. Lawrence, ascending even to Lake Ontario. It is plentiful on the Pacific coast. The *S.*-fishing in the Gulf of St. Lawrence is estimated as worth $500,000 a year, and by steamers the fish are delivered in Boston, New York, and Philadelphia in the best condition. Among the noted rivers for fly-fishing are the Gold and St. Mary's in Nova Scotia, and the S. W. Miramichi and Nepisiguit in New Brunswick. The Russian method of artificial fecundation has been used, of late years, in the Penobscot

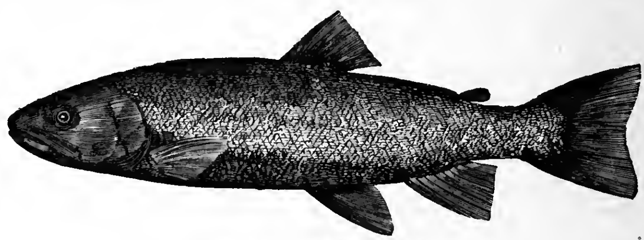

Fig. 435. — Common Salmon. (*Salmo Salar.*)

and other rivers of Maine, Massachusetts, and Connecticut, and it is confidently expected that before long these fisheries will enable us to dispense with Canadian importation. The salted *S.* is mostly shipped from St. John, New Brunswick, packed in barrels, half-barrels, and kits.

Salmon-Peel, a young salmon.

Salmon-Trout, a fine fresh-water fish, the *Salmo trutta.*

Salonica. See Turkey.

Salsify, Oyster-Plant, a garden vegetable, the *Tragopogen porrifolius.* The nutritious and subaromatic roots are sweet and tender, and much esteemed as an esculent. Its cultivation has become of late quite extensive in our Eastern States.

Sal-Soda, a commercial name for the carbonate of soda.

Salt [Fr. *sel;* Ger. *Salz;* It. *sale;* Sp. *sal*]. The common salt, or sodic chloride, has been known and in common use as a seasoner and preserver of food from the earliest ages. Immense masses of it are found in this and many other countries, which require only to be dug out and reduced to powder. In that state it is called rock-salt. The water of the ocean also contains a great quantity of salt, to which, indeed, it owes its taste, and the power which it possesses of resisting freezing till cooled down to 28°.5. When this water is sufficiently evaporated, the salt precipitates in crystals. This is the common process by which it is obtained in many countries. In a commercial point of view, perhaps, the most important source of supply consists of brine-springs. There are various processes by which salt may be obtained quite pure. Com-

mon salt usually crystallizes in cubes. Its taste is universally known and is what is strictly denominated *salt*. Its sp. gr. is 2.125. It is soluble in 8.82 times its weight of cold water, and in 2.76 times its weight of boiling water.

Besides its vast utility in seasoning food, and preserving meat both for domestic consumption and during the longest voyages, and in furnishing hydrochloric acid and soda, salt forms a glaze for coarse pottery, by being thrown into the oven where it is baked; it improves the whiteness and clearness of glass; it gives hardness to soap; in melting metals it preserves their surface from calcination, by defending them from the air, and is employed with advantage in some assays; it is used as a mordant, and for improving certain colors; and enters more or less into many other processes of the arts. In warm countries, salt is obtained by the evaporation of sea-water by the heat of the sun; and the crystals of salt made in this way are more perfect and purer, from the greater slowness of the process. French salt is manufactured in this mode, and it has always been in considerable demand. "The U. States is well supplied with salt, 23 of the States and Territories having been returned by the different censuses since 1810 as producers, while seven others possess valuable springs or deposits. Rock salt has been found only in S. W. Virginia and in Louisiana. The principal springs are in central New York, near Syracuse, in West Virginia and Pennsylvania, in Michigan, and in the States bordering on the Ohio. Salt lakes occur in California, Utah, New Mexico, Texas, and Minnesota. Salt has been made from sea-water in nearly every Atlantic State at some period. Virginia had salt-works at Cape Charles before 1620, and in 1633 exported salt to Massachusetts. The salt-springs of New York are principally in Onondaga Co., in the towns of Syracuse, Salina, and Geddes, and issue from rocks of upper Silurian age. They were known to the Indians at a very early period, but Father Lalemant is believed to have been the first white man who visited them. About 1770 Onondaga salt was in common use among the Delawares, and was carried to Quebec for sale. The first made by the whites was in 1788, near Syracuse, by boiling. The salines belong to the State, which supplies the brine to manufacturers, and receives a royalty of one cent a bushel, which suffices to defray the expenses of pumping, superintendence, etc. In 1789-1790, 500 or 600 bushels were made, and sold at $1 a bushel. In 1791 the capacity of the works was 8,000 bushels a year. In 1862 the production reached the maximum of 9,053,874 bushels; since that year the average has been about 8,000,000 bushels, gradually declining since 1870 to about 6,500,000 bushels. The productive springs are in great part found in the marshy lands which surround Onondaga Lake. A stratum of marl 3 to 12 ft. thick, underlaid by a marly clay, forms an impervious barrier between the water raised from the wells and that of the lake. Wells are sunk or bored in the low lands around the lake, from 200 to 300 ft., and from these the salt water is forced up by pumps into the reservoirs from which the evaporating works are supplied. The strata passed through near the surface are beds of fine sand, and then clay, sometimes more than 40 ft. thick, beneath which is gravel of pebbles and sand containing salt water. The brine is of variable strength in the different wells, as indicated by its sp. gr., and from 30 to 45 gallons are required for a bushel of dry salt weighing 56 lbs." — *American Cyclopædia*. The commercial varieties are characterized by the size and compactness of the grains. The whole annual product of salt in the U. States is about 25,000,000 bushels, besides which about 15,000,000 of bushels are imported, chiefly from England, Canada, and Italy. For the year 1879 the imports amounted to 906,615,313 lbs., valued at $1,775,741. *Imp.* duty: in bulk, 8 cts. per 100 lbs.; in bags, sacks, barrels, or other packages, 12 cts. per 100 lbs. — Foreign salt used without the limits of the U. States in curing fish of American catch, free. See SALTS.

Salter, a dealer in salt, a dry-salter; one who cures meat or fish with salt.

Saltern, a place where salt is obtained from sea-water.

Salt-Fish, fish that has been salted and packed in barrels, etc., as cod, herrings, salmon, etc.

Salt-Junk, hard, dry, cured beef.

Salt Lake City. See UTAH.

Saltpetre, NITRATE OF POTASH [Fr. *salpêtre;* Ger. *Saltpeter;* Hind. *shorah;* It. *nitro, salnitro;* Sp. *nitro, salitre*], a salt well known in commerce, and of great importance. It may be regarded both as a natural and an artificial production; being found on the surface of the soil in many parts of India, Egypt, Italy, etc.; but in these and other places all that is known in commerce is obtained by an artificial process, or by lixiviating earth that has been formed into *nitre* beds. *S.* forms the principal ingredient in the manufacture of gunpowder, and is used in various arts. It is also of great utility in the commerce of India, from its furnishing a large amount of dead weight for the shipping engaged in it. *S.* possesses considerable antiseptic power. That which is of the best quality and well refined is in long, transparent crystals; its taste is sharp, bitterish, and cooling; it flames much when thrown upon burning coals; it is very brittle; sp. gr. 1.933. It is not altered by exposure to the air. Our imports, mostly from Calcutta, for the year 1879, amounted to 9,376,734 lbs., valued at $384,827. *Imp.* duty: crude, 1 ct. per lb.; refined and partly refined, 2 cts. per lb.

Salts, combinations of acids with alkaline or salifiable bases. Table salt is chloride of sodium; Epsom salt, sulphate of magnesia; Glauber's salt, sulphate of soda; Glazer salt, sulphate of potash, etc.

Imp. duty: preparations of salts, n. o. p. f., 20 per cent; if medical preparations, 40 per cent; Epsom salt, 1 ct. per lb.; Glauber salt, ½ ct. per lb.

Salvage, in the law of shipping, is a remuneration to those who, by gratuitous exertion or risk, save a ship or cargo, or any portion of them, from destruction by the elements, or from loss by capture.

It is not due to those who are bound by law and contract to exert themselves on the occasion; and thus the master and crew can have no *S.* for services in protecting their own vessel. When a vessel is captured, *S.* is due on her recapture. *S.* is due, moreover, in cases where accident rather than exertion or risk has enabled the party to preserve the property; as, where portions of ship's apparel, anchors, or merchandise, are picked up at sea. Passengers are not in the general case entitled to any reward for assistance in saving the vessel in the safety of which their own lives, or at least their comfort and convenience, are embarked; but the passenger is not bound like the mariner to stick to the vessel; and if he remain when he could depart, and perform gratuitous and perilous services, he is entitled to a consideration. If the preservation of life can be connected with the preservation of property, whether by accident or not, the Court of Admiralty can take notice of it, but has no power of remunerating the mere preservation of life, which must be left to private bounty. There is no rule for estimating the amount of *S.* in all cases; nor, from the nature of the claim, does any fixed rule seem capable of being applied. Where the amount is disputed, the jury must consider the whole circumstances, and award accordingly. The master and crew of the vessel — the individuals, in short, who have exerted themselves or incurred personal risk — are those who are primarily entitled to the *S.* allowance; but where their ship has been put in peril, or has suffered from wear and tear, the owners are entitled to a proportional compensation. Where third parties interfere to assist in a *S.*, there must be a clear case of necessity for their aid, to justify their claim for a share of the *S.* money; but it is a rule that, in case of preservation from an enemy, a vessel of war, if in sight, shares in the *S.* The property actually benefited is charged with the expense; and so freight is chargeable, if it was earned, and has been preserved by the act of the salvors. — When property wrecked or abandoned at sea is found and taken possession of, the finder has a lien on it till a reasonable *S.* be tendered to him. Where, however, the parties whose right and duty it is to protect the property are present, other parties are not entitled to take possession of it, or to interfere, except as assistants.

Salve, in pharmacy, an adhesive composition; a substance applied to heal, mollify, or relieve wounds or sores; an unguent; an ointment; a plaster.

Salver, a silver or plated tray.

Samana. See HAYTI.

Samphire, the aromatic, saline, fleshy leaf of the *Crithmun maritimum*, a plant inhabiting rocky cliffs of the sea coasts, which is a favorite ingredient in pickles.

Sample, a small quantity of a commodity exhibited at public or private sales, as a specimen. Sugars, wool, spirits, wine, coffee, and, indeed, most species of merchandise, are sold by sample. If an article be not, at an average, equal to the sample by which it is sold, the buyer may cancel the contract, and return the article to the seller.

Imp. duty: "Small pieces of silk, cotton, or other fabric; small quantities of raw material, and, generally, articles of any description having little or no intrinsic value as merchandise, in regard to which the proper officers of the customs are to exercise a reasonable discretion, are admitted from abroad free of duty. But samples imported in quantities and packages suitable for sale, are dutiable."

Sampler, one who selects samples from bales, casks, or packages, or from the mass or bulk.

Sampling, taking from the mass or lot of goods, fair specimens from which the commercial character and value of the whole may be judged.

Samshoo, a spirituous liquor, extracted, by fermentation and distillation, from rice, by the Chinese.

Sand, properly speaking, is very small particles of quartz, silica, or flint, though the name is sometimes given to other stony fragments. It results from the gradual decay of rocks, whether on the seashore or in sandstone districts; and it owes its various colors chiefly to the various oxides of iron with which it is impregnated. The kinds differ in fineness or sharpness, as well as in color. Some or other of them are used in glass making, sand-paper making, iron and brass founding, mortar and cement making, stone sawing and grinding, filtering, polishing-dust, hour-glasses and egg-timers, and many other purposes in the arts. In general, river sand and pit sand are sharper than sea sand. Silver sand, a very fine sort, is of great value in glass making. *Imp.* duty, 10 per cent.

Sandal, a rough-made protection for the sole of the foot; a hide or skin shoe without uppers, bandaged or fastened round the ankle.

Sandal-Wood, an odoriferous wood, the produce of several species of *Santalum*, in India and the Pacific islands, of which there are two commercial kinds, the white, probably the outer layers of the wood, and the yellow, or citron, the inner wood. The odor is very strong, rose-like, and enduring. The essential oil, to which this odor is due, is extensively used for the adulteration of attar of roses. Sandal-wood is very hard, heavy, and susceptible of a fine polish, and extensively used by cabinet-makers in the fabrication of various articles of ornamental furniture. Sandal-wood is also a name among the Russians for the red wood of the *Rhamnus dahuricus*, used for dyeing leather. *Imp.* free.

Sandarac, a white juniper resin in round or long tears, not unlike mastic, but brittle, obtained from the *Thuja articulata*, in Barbary and Central Africa. *Imp.* free.

Sand-Bag, a long, thin bag of sand, applied to chinks in window-sashes to exclude draught; a larger bag filled with sand, used in field fortifications.

Sand-Balls, soap mixed with sand, made into round balls for toilet use.

Sand-Bath, a vessel filled with heated sand.

Sand-Blast, an engraving process invented by Mr. C. Tilghman of Philadelphia, engineer, in which a stream of sand is introduced into a rapid jet of steam or air so as to acquire a high velocity, and is then directed upon any hard or brittle substance so as to cut or wear away its surface.

For ordinary rough work, such as cutting stone, where a considerable quantity of material is to be removed, a steam jet of from 60 to 120 lbs. pressure has generally been used as the propelling agent. The sand is introduced by a central tube $\frac{1}{8}$ in. bore, and the steam issues from an annular passage surrounding the sand tube, on the principle of the Giffard injector. The impetus of the steam then drives the sand through a steel tube $\frac{3}{8}$ in. bore, and about 6 in. long, imparting velocity to it in the passage, and the sand finally strikes upon the stone, which is held about 1 in. distant when a deep, narrow cut is desired, but may be 18 or 24 in. distant when a broad surface is to be operated on. To produce ornaments or inscriptions on stone, either in relief or intaglio, a stencil of iron or caoutchouc is held or cemented to the stone, and the sand jet is moved with an even and steady motion over the whole surface, so that all the exposed parts may be cut to the same depth. The skill and time of the artist may be devoted exclusively to making the stencil; this being prepared, the most elaborate and intricate designs can be cut as rapidly as the most simple.

Sanders-Wood, a red dye-wood obtained from *Pterocarpus santalinus*. See RED SANDERS-WOOD.

Sandever, SANDIVER, a corruption of the French "Suint de verre," the saline scum or alkaline sulphates formed on glass-pots known as glass-gall. It is used as a flux in certain metallurgic operations.

Sand-Glass, HOUR-GLASS, a species of chronometer or clepsydra, measuring intervals of time by the running of water or sand from one glass into another. The quantity of sand is so proportioned as to measure different spaces of time, as an hour, half-hour, quarter, or minute; the last-mentioned being generally used at sea when "heaving the log," to ascertain the speed of the ship.

San Domingo. See HAYTI.

Sand-Paper, an abrading material made by coating paper with glue and dusting fine sand over it with a sieve. Thin cotton cloth is sometimes used instead of paper. Sand-paper is intermediate between glass-paper and emery-paper in its action on metals, but is less energetic than glass-paper in its action on wood.

Sandstone, as a material for building, is a curious kind of natural concrete, being made up of small particles of quartz or silex cemented with argillaceous and calcareous matter. It is frequently laminated, sometimes having little fibres or plates of mica parallel with the beds or layers. This accounts for the fact that sandstone, if built up with the laminæ vertical, decays more quickly than if horizontal, for the layers in effect fall away one after another, or peel off. The particles of quartz or silex are virtually indestructible; but the cementing matter is affected by air and moisture in a degree varying with different kinds of stone.

Sandusky, a port of entry and city of Ohio, on the S. shore of Sandusky Bay, 3 m. from Lake Erie, 105 m. N. by E. of Columbus; lat. 41° 27′ N., lon. 82° 45′ W. The bay, 20 m. long and about 5 m. broad, with an average depth of 14 feet, forms a commodious and safe harbor. Sandusky has 3 national banks, and is particularly noted for its manufactures of articles in wood. The Lake Erie division of the Baltimore and Ohio railroad, and the Cincinnati, Sandusky and Cleveland, and Lake Shore and Michigan Southern railroads, meet there. The value of imports from Canada for the year 1879 was $19,941; of exports, $9,086. The number of entrances was 228, tonnage 15,827; clearances 234, tonnage 17,127. The number of entrances in the coastwise trade was 2,828, tonnage 526,103; clearances 2,851, tonnage 516,379. Pop. 25,000.

Sandwich Islands. See HAWAIIAN ISLANDS.

San Francisco. See this name in the Appendix.

San Juan Del Norte. See NICARAGUA.

San Salvador, the smallest of the five republics of Central America, consisting of a strip of territory stretching along between Honduras and the Pacific Ocean, between lat. 13° and 14° 30′ N., lon. 87° 30′ and 90° 20′ W. It is bounded N. and E. by Honduras, S.E. by Fonseca Bay, S. by the Pacific, and N.W. by Guatemala.

The soil is in many places exceedingly fertile, but the country is generally hilly and mountainous. Official returns state the area of the republic to embrace 9,594 sq. m. The pop. was estimated in 1870 at 434,520 souls, giving an average of

45 inhabitants to the sq. m., being four times that of the aggregate of the other States of Central America. Aboriginal and mixed races constitute the bulk of the pop., among whom live about 10,000 whites, or descendants of Europeans. The native pop. of San Salvador, more inclined to civilized pursuits than that of any neighboring State, is largely engaged in agriculture, as well as various branches of manufacture, and, in recent years, the working of iron mines has been undertaken. The principal articles of agricultural produce are indigo, coffee, and balsam, the latter being known as Balm of Peru, being grown along a great part of the Pacific coast, from the Rio Acajutla to the Guameca, the district bearing the name of Costa de Balsamo. *San Salvador*, the capital, founded by George Alvarado in 1528, has 16,000 inhabitants. The city was repeatedly destroyed by earthquakes and volcanic eruptions, the last time on April 16, 1854, when it was overwhelmed by almost total ruin, in consequence of which most of the inhabitants erected new dwellings on a neighboring site, at present called Nueva San Salvador. The new capital again was partly destroyed by a series of earthquakes, and simultaneous eruptions of the neighboring Tzalco volcano, which began March 4, and ended March 19, 1873. The capital is connected by a good road with the port of *La Libertad*, 15 m. distant. *La Union*, a small town on the W. shore of the Bay of Fonseca, has also an extensive and safe port.

The commercial intercourse of San Salvador is chiefly with the U. States and Great Britain. In the year 1876, the value of the total imports was $2,150,560, and that of the exports $3,396,105. Among the exports indigo forms the staple article. The statistics of the commercial intercourse of San Salvador with the U. States are not given in the annual statement of the Secretary of the Treasury, in which the trade of the republic is thrown together with that of the States of Costa Rica, Guatemala, Honduras, and Nicaragua, under the general designation of "Central America." San Salvador had, in 1871, but a small public debt, amounting to $705,500, represented chiefly by "libranzas," or treasury bills. The debt was largely increased during the years 1872 and 1873, when the republic raised at various periods troops to invade Honduras. At the commencement of 1875, the total debt amounted, according to an official return, to $4,363,227. There exists besides a floating debt of an unknown amount.

Money, weights, and measures are the same as in HONDURAS, which see.

Sans Recours, without recourse. These French words are still sometimes put on a bill of exchange or note before the payee indorses, so that the bill may be transferred without responsibility to the indorser, but the more common practice is to use the English words.

Santa Cruz. See CANARY ISLANDS.

Santa Fé. See NEW MEXICO.

Santenay. See BURGUNDY WINES.

Santo Domingo, or SAN DOMINGO. See HAYTI.

Santonine, the vermifuge principle of the *Semen contra*, a medicinal substance obtained from the flower-heads of some of the *Artemisias*, and a most powerful anthelmintic. See SEMENCINE.

Santos. See BRAZIL.

São Luiz, or MARANHÃO. See BRAZIL.

São Salvador or BAHIA. See BRAZIL.

Sapan-Wood is obtained from a species of the same tree that yields the Brazil-wood (*Cæsalpinia sapan*, Linn.). It is a middle-sized forest tree, indigenous to Siam, Pegu, the Philippine Islands, etc. It has been employed for dyeing in the greater part of Asia for many centuries. It found its way into Europe some time before the discovery of America; and the imports are now very considerable. Its coloring matter differs but little from that of Brazil-wood, but the best sapan-wood does not yield more than half the quantity that may be obtained from an equal weight of Brazil-wood, and the color is not quite so bright.

Sap-Green, a vegetable pigment composed of the coloring matter of the berries of the *Rhamnus catharticus*, and lime.

Sapin, the French name for the fir or pine.

Sappadilla, a name for the soursop fruit, *Anona muricata*.

Sapphire [Fr. *saphir;* Ger. *Sapphir;* It. *zaffiro;* Sp. *safiro*], a precious stone in very high estimation. Colors blue and red; also gray, white, green, and yellow. It occurs in blunt-edged pieces, in roundish pebbles, and crystallized. Varies from transparent to translucent. Refracts double. After diamond, it is the hardest substance in nature. The blue variety, or sapphire, is harder than the ruby, or red variety. Brittle; sp. gr. 4 to 4.2. It is found in Bohemia, Saxony, France, etc.; but the red sapphire, or Oriental ruby, is not found in any considerable quantities anywhere except in Ava. Next to diamond, sapphire is the most valuable of the gems. The white and pale-blue varieties, by exposure to heat, become snow-white, and, when cut, exhibit so high a degree of lustre that they are used in place of diamonds. The most highly prized varieties are the crimson and carmine red; these are the Oriental *ruby* of the jeweller; the next is *sapphire;* and last, the yellow or Oriental *topaz.* The *asterias*, or star-stone, is a very beautiful variety, in which the color is generally of a reddish violet, and the form a rhomboid, with truncated apices, which exhibit an opalescent lustre.

Sard, a deep-brownish chalcedony, exhibiting a blood-red color when held up to the light. See SARDONYX.

Sardine, a species of fish of the herring tribe, but smaller They are taken in considerable quantities on the European coasts of the Atlantic and along the shores of the Mediterranean. The small sardines caught on the coast of Provence, in France, are esteemed the best. From 1,000 to 1,200 fishing-smacks are engaged in catching this fish on the coast of Brittany from June to the middle of October. Its flesh is very delicate. Sardines are salted, or preserved in olive-oil and butter and put up in tin cases for exportation. Our imports of sardines for the year 1879, mostly from France, were valued at $912,391. *Imp.* duty, preserved in oil or otherwise, 50 per cent.

Sardinia, a large island of the Mediterranean, belonging to the kingdom of Italy, between lat. 39° and 41′ N., lon. 8° and 10′ E., separated from Corsica on the N. by the Strait of Bonifacio. It is in an oblong form, 160 m. long from N. to S., and 60 m. in average breadth; area with its dependent islands, 9,240 m. The surface is mountainous; and the soil generally fertile, producing principally wines, wheat, flax, linseed, hemp, saffron, tobacco, vanilla, and cork. Pop. 636,660.—*Cagliari*, the principal seaport of the island, is situated on the N. E. shore of a spacious bay of the same name, lat. 39° 12′ 13″ N., lon. 9° 7′ 44″ E.; pop. 30,000. The Gulf of Cagliari extends from Pula on the W., to Cape Carbonara on the E., a distance of about 24 m. across, and about 12 in depth, with good anchorage everywhere after getting into soundings. A mole projects from the Pratique office, and ships usually lie about 1 m. S.W. by S. from it, in six or eight fathoms' water, on an excellent bottom of mud. There is a very convenient pier harbor at the S. angle of the tower wall, capable of containing 14 or 16 vessels of a tolerable size besides small craft. Altogether, Cagliari is one of the best and safest ports in the Mediterranean.

Sardonyx, a precious stone, of reddish-brown color, consisting of alternate layers of chalcedony

and carnelian. Its name is derived from the union of the sard and the onyx. The ancients selected this substance to engrave upon, no doubt, from its possessing two peculiar and necessary qualities, viz., hardness and tenacity, by which it is capable of receiving the finest touch or stroke of the tool without chipping, and showing the art of the engraver to the highest perfection. They are much used for signet rings, and for cups, vases, knife handles, beads, etc. The finest come from the East.

Sarking, the sheathing of a roof above the rafters, and affording a hold for the nails which secure the shingles or slates.

Sarsaparilla [Fr. *salsepareille;* Ger. *sarsaparille;* It. *salsapariglia;* Sp. *zarzaparilla*], the root of the *Smilax sarsaparilla*, a plant growing in South America and the West Indies. It is imported in bales. It is known in commerce by the names of Lisbon, Honduras, and Vera Cruz, but it is also brought from Jamaica. The Lisbon root, which is the produce of Brazil, has a reddish or dark brown cuticle, is internally farinaceous, and more free from fibre than the other kinds: the Honduras has a dirty brown, and sometimes whitish, cuticle; it is more fibrous, and has more ligneous matter than the Lisbon and Vera Cruz. It is in long, slender twigs, covered with a wrinkled brown cuticle, and has a small, woody heart. The Jamaica differs from the others, in having a deep red cuticle of a close texture, and the red color partially diffused through the ligneous part. The root is inodorous, and has a mucilaginous, very slightly bitter taste: the bark is the only useful part of the plant; the ligneous part being tasteless, inert, woody fibre. The S. syrup, drunk in soda water under the impression that it is healthful, rarely contains any of the drug. *Imp.* free.

Sash, silk or other waist-belt for females.— A scarf worn by military men over the shoulder. —A long chequered window-frame for holding squares of glass for windows. See Sash-Frame.

Sash-Door, a door with panes of glass to give light.

Sash-Moulding Machine, in wood-working, a machine for planing moulds on sash bases and stiles.

Sash-Frame, the wooden or metal bordering or frame-work, for setting squares of glass for windows.

Sassafras, a species of laurel, *Sassafras officinale*, a native of the southern parts of North America, Cochin-China, and several of the Indian islands. Sassafras wood, root, and bark have a fragrant odor, and a sweetish aromatic taste. The wood is of a brownish-white color; and the bark ferruginous within, spongy, and divisible into layers. Their sensible qualities and virtues depend on an essential oil, which may be obtained separate by distilling the chips or the bark with water. It is very fragrant, hot, and penetrating to the taste, of a pale yellow color, and heavier than water. It is used only in the materia medica. *Imp.* duty: root and bark, free; oil, 50 per cent.

Satin [Fr. and Ger. *satin*], a silk stuff first imported from China, which is distinguished by its very smooth, polished, and glossy surface. It is woven upon a loom with at least five-leaved healds or heddles, and as many corresponding treadles. These are so mounted as to rise and fall four at a time, raising and depressing alternately four yarns of the warp, across the whole of which the weft is thrown by the shuttle, so as to produce a uniform smooth texture, instead of the checkered work resulting from intermediate decussations, as in common webs. Satins are woven with the glossy or right side undermost, because the four fifths of the warp, which are always left there during the action of the healds, serve to support the shuttle in its race. Were they woven in the reverse way, the scanty fifth part of the warp threads could either not support, or would be too much worn by the shuttle.

Satin-de-laine, a black cassimere manufactured in Silesia from wool.

Satinet. In England a fine mixed fabric woven to imitate satin is known by this name, but in the U. States the term is applied to a cheap article composed of cotton and wool, and used principally for trousers stuff. The warp is cotton, and the filling is mostly short, inferior, or waste wool, which is mixed with enough long wool to enable it to be spun, and is woven in such a way as to bring the wool to the face of the cloth; it is then felted, and the cotton is entirely concealed by the wool.

Satinette, the name for a kind of silky fabric, somewhat resembling satin, but more durable, and the lustre on which is produced in the process of manufacture, without dress or any other artificial means.

Satin Jean, a cotton fabric woven with a satin face, used for corsets, etc.

Satin-Stone, a fibrous kind of gypsum used by lapidaries. It exhibits, when polished, a lustre like satin.

Satin Wood, a beautiful veneering wood, well known for its glossy yellow shades, and of which there are several varieties. That obtained in India is from the *Chloroxylon swietenia.*

Sauceboat, an earthenware or plate vessel with a lip for pouring out sauce.

Saucepan, a small kitchen pot or boiler, with a handle; a cooking utensil of iron or copper, sometimes tinned or enamelled.

Saucer, a small, circular, shallow platter of china or crockeryware, for standing teacups in.

Sauer-Kraut, a salted preparation of cabbage much esteemed in Germany, and among the German population of the U. States, and of which large quantities are got ready for winter use. *Imp.* free.

Saumon [Fr.], a pig of lead, pewter, etc.

Sausage, a long roll of chopped and highly seasoned meat, beef, or pork in a skin. *Imp.* duty, 35 per cent. See Bologna Sausage.

Sausage-Machine, a mincing machine.

Sauterne. See Claret Wines.

Savannah. See Georgia.

Save-All, a small metal or other stand placed in a candlestick, to support the short candle ends while burning.

Savine, the plant *Juniperus sabina*, whose stimulating and diuretic properties, as a drug, are well known.

Savine-Oil, an essential oil obtained by distilling the tops of the savine plant.

Savings Bank. See this word in the Appendix.

Savonnette [Fr.], a soap-ball for washing.

Savory, an herb, of which there are two varieties, the summer savory (*Satureia hortensis*), and the winter savory (*S. montana*): being aromatic and carminative, they are used as an ingredient in culinary seasoning.

Savoy, a species of small curled-leaf winter cabbage, the *Brassica oleracea sabauda.*

Saw, a steel cutting-plate with a serrated edge or teeth, which act as wedges to tear their way through an obstacle. Saws are either reciprocat-

ing or circular. The common hand-saw and the pit-saw are examples of the former. There are various kinds made, as half-rip, hand and panel, brass-back, iron-back, table-saws, lock-saws, gen-

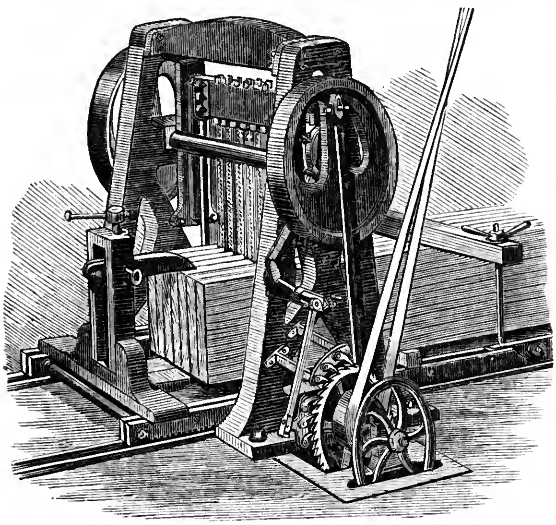

Fig. 436. — Vertical Saw.

tlemen's hand-saws, frame, pit, and cross-cut saws, mill and circular saws, stonecutters'-saws, garden and pruning saws, keyhole-saws, woodcutters'-saws, bow saw and frames, metal saw and frames, etc.

Everybody is familiar with the up-and-down movement of a common saw, and in the machine for sawing balks of timber into planks, represented in Fig. 436, this reciprocating motion is retained, but there are a number of saws fixed parallel to each other in a strong frame, at a distance corresponding to the thickness of the planks. The saws are not placed with their cutting edges quite upright, but these are a little more forward at the top, so that as they descend they cut into the wood, but move upwards without cutting, for the teeth then recede from the line of the previous cut, while in the mean time the balk is pushed forward ready for the next descent of the saw-frame. This pushing forward, or *feeding*, of the timber is accomplished by means of ratchet-wheels, which are made to revolve through a certain space after each descent of the saw-frame, and, by turning certain pinions, moves forward the carriage on which the piece of timber is firmly fixed, so that when the blades of the saws are beginning the next descent they are already in contact with the edge of the former cut. To prevent the blades from moving with injurious friction in the saw-cuts, these last are made of somewhat greater width than the thickness of the blades, by the simple plan of bending the teeth a little on one side and on the other alternately. The rapidity with which the machine works, depends of course on the kind of wood operated upon, but it is not unusual for such a machine to make more than a hundred cuts in the minute. The figure shows the machine as deriving its motion by means of a strap passing over a drum, from shafting driven by a steam-engine. This is the usual plan, but sometimes the steam power is applied directly, by fixing the piston-rod of a steam cylinder to the top of the saw-frame, and equalizing the motion by a fly-wheel on a shaft, turned by a crank and connecting-rod. — A very effective machine for cutting pieces of wood of moderate dimensions is the *circular saw* (Fig. 437). Here there is a steel disk, having its rim formed into teeth; and the disk is made to revolve with very great speed, in some cases making as many as five hundred turns in a minute, or more than eight in a second. On the bench is an adjustable straight guide, or fence, and when this has been fixed, the workman has only to press the piece of wood against it, and push the wood at the same time towards the saw, which cuts it at a very rapid rate. The circular saw is now usually provided with apparatus by which the machine itself pushes the wood forward, and the only attention required from the workman is the fixing of the wood upon the bench, and the setting of the machine in gear with the driving-shaft. Similar saws are used for squaring the ends of the iron rails for railroads, two circular saws being fixed upon an axle at a distance apart equal to the length of the rails. The axle is driven at the rate of about 900 turns per minute, and the iron rail is brought up parallel to the axle, being mounted on a carriage, and still red hot, when the two ends are cut at the same time by the circular saws, the lower parts of which dip into troughs of water to keep them cool.

Sawdust, the small fragments made in cutting wood, which is used in wine-cellars for laying bottles in; as a stuffing material for dolls and cushions; for sprinkling floors in public-houses, the arenas of amphitheatres and riding-schools, and other purposes.

Saw-File, a mechanic's tool for sharpening saws, of which there are several kinds made, as hand-saw files, rip-saw files, tenant-saw files, frame-saw files, pit-saw files, etc.

Sawing-Machine, machinery for sawing wood, metal, etc. See Saw-mill.

Saw-Mandrel, a holdfast for a saw in a lathe.

Saw-Mill, machinery worked by steam or water-power, for cutting, moulding, or planing wood, by means of several saws; and for cutting veneers, and sawing stone, slate, and marble. Saw-mills are of two kinds; the circular, cutting by a

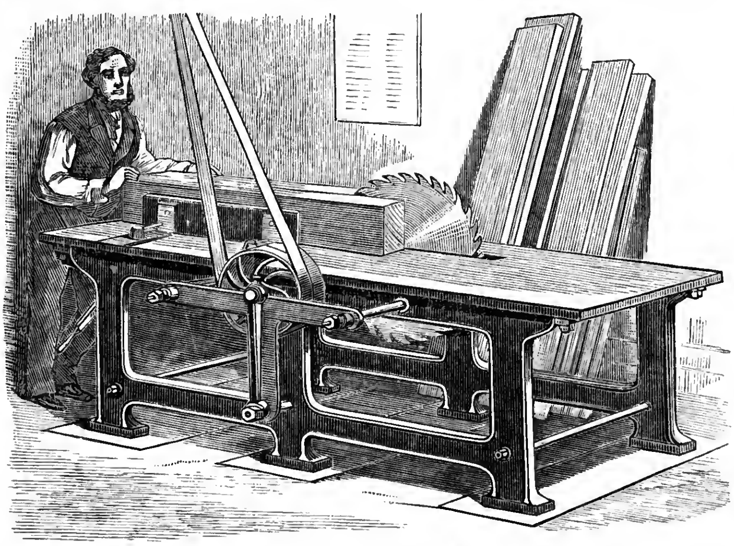

Fig. 437. — Circular Saw.

continuous rotation, and the reciprocating, which operate as the common pit or frame saw. See SAW.

Saw-Pad, a wooden handle forming a case for a small saw, which fits in at the end with a spring and screws.

Saw-Pit, a place for sawyers to cut logs of timber into planks and scantlings, by means of a frame-saw.

Saw-Set, a triangular file, used by carpenters, sawyers, and others, for sharpening their saws.

Sawyer, one employed in cutting logs into planks, either by hand or machinery.

Sax-Cornet, SAX-HORN, musical wind instruments usually made of brass. See HORN.

Saxon-Blue, the sulphate of indigo, much used as a dye-stuff.

Saxony, a constitutional hereditary kingdom, the third in importance and population of the German Empire, bounded N., N. E., and W. by Prussia, S. E. and S. by Bohemia, and S. W. by Bavaria, between lat. 50° 10′ and 51° 28′ N., lon. 11° 35′ and 15° 3′ E.; area, 6,777 sq. m. Pop. 2,760,-586. It is divided into the four districts of Dresden, Leipsic, Zwickau, and Bautzen. *Dresden*, its splendid capital, is situated on both sides of the Elbe, 109 m. S. S. E. of Berlin, and 60 m. S. E. of Leipsic. It is chiefly celebrated for its art and literary collections; pop. 197,295. The second city in importance and pop. is *Leipsic* (Ger. *Leipzig*), 92 m. S. S. W. of Berlin. Its three annual commercial fairs are the most important in Europe, and are attended by merchants of almost all nations. Leipsic is, however, still more extensively known by the book trade of which it is the centre, the number of publishers and booksellers being about 250; of printers 50. Pop. 127,387.

S. is shaped as a triangle, of which the longest line is the frontier on the side of Bohemia, formed by a range of mountains, extending in a long line from S. W. to N. E. In the southern and mountainous parts, the valleys only are well cultivated; but in the level districts in the north, tillage is general. The mean elevation of the country is about 1,100 feet —*Rivers.* The principal are the Elbe, the two Elsters, the two Muldas, the Pleisse, and the Saale. The agricultural products consist of the usual cereals and leguminous plants, with rape, buckwheat, hops, flax, and fruits of all kinds suited to the climate. The forests supply timber of excellent quality, and in such abundance as to render them a great source of industry and wealth. The minerals are another great source of wealth, the ores being both rich and abundant. The mines consist of silver, tin, bismuth, cobalt, iron, zinc, lead, nickel, arsenic, etc., besides coal, marble, porcelain-earth, and various gems, — as topazes, chrysolites, amethysts, carnelians, garnets, etc. The smelting is centralized in large establishments belonging to the State. Manufacturing industry has been greatly developed, and in some branches carried to a high degree of perfection, employing about three fifths of the population; the linen manufacture employs more than 16,000 looms, but cotton spinning and weaving are in a measure superseding it. Broadcloths, merinos, silks, mixed silk and woollen goods, thread, muslin-delaines, laces, and embroideries maintain a high reputation. Saxon pottery and porcelain, — "the Dresden china," — have long been famous; all these form its chief exports. S. has the second largest university in Germany, that of Leipsic, founded in 1409, and attended, on the average of recent years, by nearly 3,000 students. The public debt amounted in 1880 to $87,222,010, incurred almost entirely for the establishment and purchase of a network of railroads and telegraphs, and the promotion of other works of public utility.

Saybrook. See CONNECTICUT.

Scabbard, the case or sheath for a sword, made of metal, leather, or wood.

Scaffolding, a temporary erection raised on poles in the progress of building, or for white-washing, painting, etc.

Scagliola, an ornamental plaster-work, made of finely ground calcined gypsum worked into a paste with glue. It produces the most perfect imitation of marble, from which it can scarcely be distinguished either by the eye or the touch, as it takes an equally high polish, and is equally hard and cold to the touch.

In the process of manufacture, the purest of gypsum is first broken into small pieces, and after being calcined, is reduced to powder. It is then passed through a fine sieve, and mixed with Flanders glue, isinglass, etc. While in this condition, it is mixed with different coloring matters, according to the shades of color required in the variety of marble to be imitated. In this state it is laid on like cement. After hardening, the next process is to polish it; this is effected first by rubbing with pumice-stone, and afterwards by rubbing it with tripoli and charcoal on a piece of fine linen, and afterwards with felt dipped in tripoli and oil, and lastly with oil alone. One of the chief advantages of *S.*-work is that it can be applied to columns made of wood and hollow, or else filled with a plaster core. Columns of this kind do not require that support in the floor beneath which is necessary when solid shafts of marble are employed. The use of *S.* is not confined to columns and pilasters only; it can be applied to other ornamental purposes, such as table-slabs, pedestals, borders of floors, etc.

Scale, a graduated instrument for estimating measurements, making calculations, or ascertaining proportions. — A comparative list of prices, a balance. — The appendage to a weighing-beam. — The thin plates that cover the skin of certain fish, some of which, when hard, are made into very pretty flowers, brooches, and other ornaments.

Scale-Board, a thin veneer used for covering the exterior surface of pieces of furniture, etc. — A thin slip of wood used to extend a page to its true length, make types register, secure uniformity of margin, and for other purposes.

Scale-Forger, in the cutlery-trade, one who forms the inner metallic scales of a spring knife, in which the blades lie.

Scallion, a name for the shallot, the *Allium ascalonicum.*

Scallop, a bivalve of the genus *Pecten*, of which there are several species. The muscle of the shell of the common scallop, *P. concentricus*, which is common on the New Jersey coast, forms a delicate article of food.

Scalpel, a surgeon's long dissecting-knife, that tapers to a point.

Scalper, a surgical tool for rasping bones.

Scammony, a gum-resin, the produce of a species of convolvulus, or creeper plant, which grows abundantly in Syria. When an incision is made into the roots, they yield a milky juice, which being kept, grows hard, and is the scammony of the shops. It is imported from Aleppo in what are called drums, weighing from 75 to 125 lbs. each; and from Smyrna in cakes like wax, packed in chests. The former is light and friable, and is considered the best; that from Smyrna is more compact and ponderous, less friable, and fuller of impurities. It has a peculiar heavy odor, not unlike that of old cheese, and a bitterish, slightly acrid taste. The color is blackish or bluish gray, changing to dirty white, or lathering when the surface is rubbed with a wet finger. Sp. gr. 1.235. It is very liable to be adulterated; and when of a dark color, heavy and splintery, it ought to be rejected. It is used only in medicine. *Imp.* free.

Scantling, a piece of timber cut from a log, of a small size, as for studs, rails, etc. — The transverse dimensions of a piece of timber in breadth and thickness; also, a piece of timber, as a quartering for a partition, or the rafters, purlin, or pole-plate of a roof. All quartering under five inches is termed *scantling.* — In masonry, the size of the stones cut, in length, breadth, and thickness.

Scapple, to reduce a stone to a straight surface without working it smooth.

Scarborough. See GREAT BRITAIN (SEA-PORTS).

Scarf, a loose silk shoulder-belt.

Scarfing, the process of joining two pieces of timber to increase their length by notching the ends into each other.

Scarificator, a cupping instrument, consisting of ten or twelve lancets, which are discharged through apertures in its plane surface by pulling a kind of trigger, so that in passing they make a number of incisions in the part to which the instrument is applied.

Scarifier, an agricultural implement used for stirring and loosening the soil, without bringing up a fresh surface. Under the same head may be included the *grubber*, *cultivator*, and *scuffler*, all of which act on the combined principles of the plough and harrow at the same time. Some of these implements have wheels, by the raising or lowering of which the tines or prongs may be made to sink more or less into the earth.

Scarlet, a bright red color, of various tints and shades.

Scavenger, a contractor for cleansing the streets; a street orderly.

Scene, a large painted view; the fixed or movable paintings in a theatre.

Scene-Painter, a theatrical painter, who designs and paints, on canvas or wood, the scenery required for a drama.

Scent, a common name for perfumes.

Scent-Bottle, a fancy portable or toilet-table bottle for holding perfume.

Sceptre, a staff of royalty; an emblem of command.

Schabziegerkäse. See Cheese.

Schappes, spun silk made from silk waste in Switzerland.

Schedule, an inventory or catalogue. — The balance sheet of an insolvent. — An appendix or tabular form added to an act. — A table of duties or tariff of charges.

Scheele's-Green. The delicate and beautiful green color known under this name is composed entirely of arsenite of copper. Its manufacture and use are so dangerous to health, that they are forbidden in France, and should be so in other countries.

Scheffel, the old German dry and grain measure, or bushel, varying considerably in different districts; in Prussia, 1½ bushels; in Saxony, about 3 bushels; at Oldenburg, 0.544 bushel; in Rostock, 1.070 bushel. For different kinds of grain the Prussian legal scheffel is estimated to weigh as follows: wheat, 85½ lbs; rye, 80½; barley, 65; oats, 45; meal, 75; and pease, 90½. The scheffel of salt is 54 lbs.

Schenk. See Beer.

Schepel, the Dutch and Spanish name for their bushel or grain-measure; like the scheffel, it is of very variable proportions; but the legal schepel is 0.275 bushel.

Schiedam, a name for Hollands gin.

Schiste, a name for slate; also for shale; a mineral used in manufactures.

Schnapps, a German name for drams of strong spirit. In the U. States, the name is applied to Hollands gin.

Schock, a German term for 60 pieces; 3 score, or 5 dozen of anything.

Scholar, a pupil or learner; a man of letters, or one devoted to books.

Scholastic, belonging to a school or schoolmaster.

School, a place of study, for elementary teaching of different kinds, as day-schools, boarding-schools, free-schools, ragged-schools, grammar-schools, colleges, etc.; a shoal of fish; a herd of sea-lions.

School-Desk, a wooden desk for scholars to sit at.

School-Slate, a slate framed in wood, used by school-boys for ciphering or writing on.

Schooner, a small vessel with two masts, whose mainsail and foresail are suspended from gaffs, reaching from the mast toward the stern, and stretched out below by booms, and whose foremost ends are hooked to an iron, which clasps the mast so as to turn therein as upon an axis, when the after ends are swung from one side of the vessel to the other.

Scimitar, a curved sabre.

Scioto Valley R.R. runs from Columbus to Portsmouth, O., 100 m. This Co., located in Columbus, was organized in 1875, and the road completed in 1878. Cap. stock, $1,772,050; funded debt, 1st mortgage 7% bonds, due 1896, $1,300,000.

Scissel, the clippings of various metals, or of slips or plates from which blanks for coins have been cut.

Scissors, metal cutting instruments, consisting of two united blades, with holes at the handles for the fingers to pass through.

Scobs, raspings; refuse dross; saw-dust.

Scollop. See Scallop.

Scollop-Shells, metal shapes for baking oysters in.

Sconce, the hanging branch of a candelabrum, or of a wall candlestick; the socket in which a candle is placed.

Scoop, Scoup, a wooden shovel. — A metallic shovel for handling sugar, flour, etc. — A large ladle. — An instrument for wetting the sails of boats. — The bucket of a dredging-machine.

Scoop-Wheel. See Tympanum.

Scoop-Net, a net for sweeping the bottom of a river.

Score, to mark or reckon; to draw a line with a sharp instrument. — 20 pieces. — The original draught of a musical composition with all the parts marked.

Scoria, slaggy lava; dross; the recrement or matter thrown off from metals in fusion; a slag of some vitrified or crystalline dross. See Slag.

Scotch-Cambric, a cotton fabric made in imitation of French cambric.

Scotched, slightly lined; a drag or brake applied to the wheel of a carriage descending a declivity.

Scotch-Pebble. See Agate.

Scotland. See Great Britain.

Scour, to scrub or brighten; to remove grease spots.

Scouring. See Bleaching.

Scow, a large flat-bottomed boat.

Scrap-Book, a book for keeping miscellaneous prints or cuttings in; a kind of album.

Scraper, an instrument with which anything is scraped: as, 1. Among engravers, a tool with a triune blade, each edge of which is sharpened, to remove the burr or ridge which rises on a copper-plate by the use of the graver or dry point; 2. In mining, quarrying, etc., a piece of iron used to take out the pulverized matter which remains in a hole when bored previous to blasting; 3. An iron instrument, affixed to a doorstep, by which the soles of shoes, etc., are freed from mud and the like, by drawing them across it; 4. An instrument used in making and repairing roads, digging canals, trenches, etc.; 5. On shipboard, a triangular iron tool, with sharp edges, used for scraping the masts, spars, decks, etc.; also, an instrument used by calkers.

Scrap-Iron, the cuttings and parings of iron-work, which are saved, collected together, and melted again in the puddling furnaces.

Scraps, the residuum of melted fat.

Screen, a shelter of any kind; various articles bear this name, as a grate or sieve for separating stones or lumps from earth, and parting the dust from coal. — A tin frame to reflect heat in cooking. — A frame in leaves or folds to keep out draughts. — A band-fan to keep off heat of a fire. — To sift.

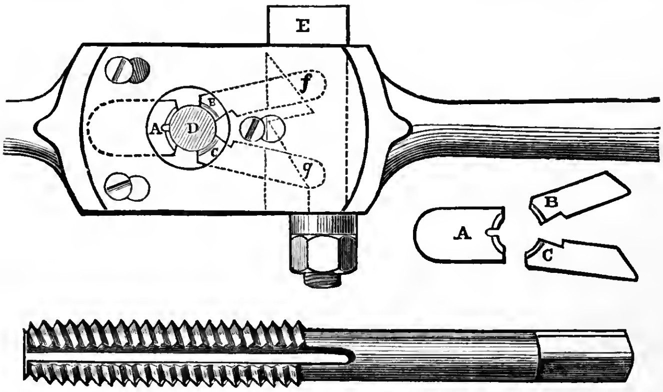

Fig. 438. — Whitworth's Screw Dies and Tap.

Screening-Machine, an apparatus for sifting earth, stamped ores, coals, etc., having a rotary motion, constantly changing the position of the article to be screened.

Screw, a spirally grooved cylinder of metal or wood; that which works a screw press; a small metal fastening.

Probably no one mechanical contrivance is so much and so variously applied as the *Screw*. The common screw-nail, which is so often used by carpenters for fastening pieces of metal on wood, or one piece of wood to another, is a specimen of the screw with which everybody is familiar. The projection which winds spirally round the nail is termed the *thread* of the screw, and the distance that the thread advances parallel to the axis in one turn is called the *pitch*. It is obvious that for each turn the screw makes it is advanced into the wood a depth equal to the pitch, and that there is formed in the wood a hollow screw with corresponding grooves and projections. Screws are formed on the ends of the bolts, by which various parts are fastened together, and the hollow screws which turn on the ends of the bolts are termed *nuts*. The screws on bolts and nuts, and other parts of machines, were formerly made with so many different pitches that, when a machine constructed by one maker had to be repaired by another, great inconvenience was found, on account of the want of uniformity in the shape and pitch of the threads. A uniform system was many years ago proposed by J. Whitworth, and adopted by the majority of mechanical engineers, who agreed to use only a certain defined series of pitches. The same engineer also contrived a hand tool for cutting screws with greater accuracy than had formerly been attained in that process. A mechanic often finds it necessary to form a screw-thread on a bolt, and also to produce in metal a hollow screw. The reader may have observed gas-fitters and other workmen performing the first operation by an instrument having the same general appearance as Fig. 438. This contains hard steel *dies*, which are made to press on the bolt or pipe, so that when the *guide-stock* is turned by the handles, the required grooves are cut out. The arrangement of these dies is shown in Fig. 438, which represents the central part of the guide-stock; A, B, C are the steel dies, retained in their places, when the instrument is in use, by a plate which can be removed when it is necessary to replace one set of dies by another, according to the pitch of thread required. The figure also shows the set of dies, A, B, C, removed from the guide-stock. D is the work, pressed up against the fixed die, A, by B and C, the pressure being applied to these last as required by turning the nut, thus drawing up the key, E, so that the inclined planes, *f*, *g*, press against similar surfaces forming the ends of the dies. For producing the hollow screws, *taps* are provided, which are merely well-formed screws, made of hard steel and having the threads cut into detached pieces by several longitudinal grooves, as represented in the lower part of Fig. 438. — The method of forming screws by dies and taps is, however, applicable only to those of small dimensions, and even for these it is not employed where great accuracy is required. Perfect screws can only be cut with a lathe, such as that represented in Fig. 439. In this we must first call the reader's attention to the portion of the apparatus marked A, which receives the name of the *slide-rest*. The invention of this contrivance by Maudsley had the effect of almost revolutionizing mechanical art, for by its aid it became possible to *produce true surfaces in the lathe*. Before the slide-rest was introduced, the instrument which cut the wood or metal was held in the workman's hand, and whatever might be his skill and strength, the steadiness and precision thus obtainable were far inferior to those which could be reached by the grip of an iron hand, guided by unswerving bars. The slide-rest was contrived by Maudsley in the first instance for cutting screws, but its principle has been applied for other purposes. This principle consists in attaching the cutting tool to a slide which is incapable of any motion, except in the one direction required. Thus the slide, A, represented in Fig. 439, moves along the *bed* of the lathe, B, carrying the cutter with perfect steadiness in a straight line parallel to the axis of the lathe. There are also two other slides for adjusting the position of the cutter; the handle, *a*, turns a screw, which imparts a transverse motion to the piece, *b*, and the tool receives another longitudinal movement from the handle, *c*. The pieces are so arranged that these movements take place in straight lines in precisely the required direction, and without permitting the tool to be unsteady, or capable of any rocking motion. Between the two sides of the bed, and therefore not visible in the figure, is a shaft placed perfectly parallel to the axis of the lathe. One end of this shaft is seen carrying the wheel, C, which is connected with a train of wheels, D, and is thus made to revolve at a speed which can be made to bear any required proportion to that of the mandril, E, of the lathe, by properly arranging the numbers of the teeth of the wheels; and the machine is provided with several sets of wheels, which can be substituted for each other. The greater part of the length of this shaft is formed with great care into an exceedingly accurate screw, which works in a nut forming part of the slide-rest. The effect, therefore, of the rotation of the screw is to cause the slide-rest

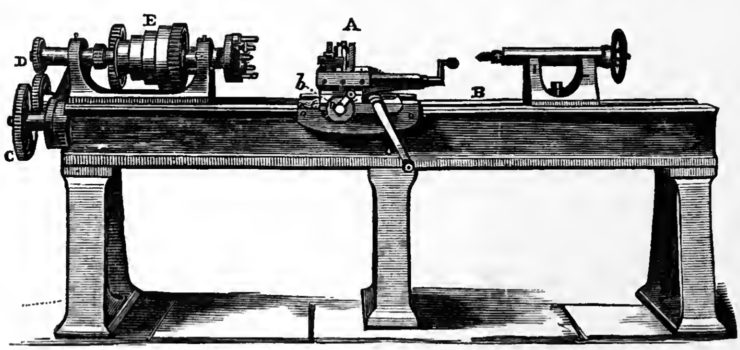

Fig. 439. — Screw-cutting Lathe.

to travel along the bed of the lathe, advancing with each revolution of the screw through a space equal to its pitch distance. There is an arrangement for releasing the nut from the guiding-screw, by moving a lever, and then by turning the winch the slide-rest is moved along by a wheel engaging the teeth of a rack at the back of the lathe. Now, if the train of wheels, C, D, be so arranged that the screw makes a revolution for each turn of the mandril, it follows that the cutting tool will move longitudinally a distance equal to the pitch of the guiding-screw while the bar placed in the lathe makes one turn. Thus the point of the cutter will form on the bar a screw having the same pitch as the guiding-screw of the lathe.

Endless screw or *worm-wheel* is a screw whose action is continuous, engaging the teeth of a wheel which is revolved thereby.

Screw-Bolt, a bolt secured by a screw.

Screw-Driver, a tool for turning screws, in shape like a blunt chisel.

Screw-Key, part of a lathe; a lever with a hole in it for turning the screw of a press. See PRESS-PIN.

Screw-Press, a press worked by a screw, used by bookbinders; a little machine for pressing table-linen, and other purposes.

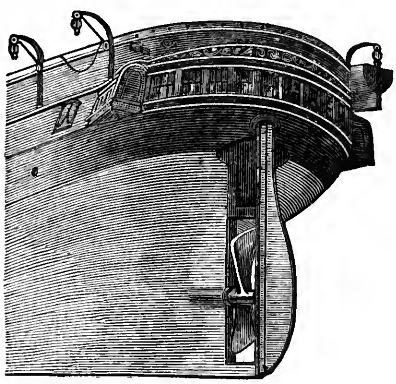

Fig. 440. — SCREW PROPELLER.

Screw-Propeller, the fan at the stern of a ship for propelling her through the water, and working on a screw.

Fig. 440 exhibits a very common form of the screw-propeller, and shows the position which it occupies in the ship. The reader may not at once understand how a comparatively small two-armed wheel revolving in a plane perpendicular to the direction of the vessel's motion is able to propel the vessel forward. In order to understand the action of the propeller, he should recall to mind the manner in which a screw-nail in a piece of wood advances by a distance equal to its pitch at every turn. If he will conceive a gigantic screw-nail to be attached to the vessel extending along the keel, — and suppose for a moment that the water surrounding this screw is not able to flow away from it, but that the screw works through the water as the nail does in the wood, — he will have no difficulty in understanding that, under such circumstances, if the screw were made to revolve, it would advance and carry the vessel with it. The reader may now form an accurate notion of the actual propeller by supposing the imaginary screw-nail to have the thread so deeply cut that but little solid core is left in the centre and supposing also that only a very short piece of the screw is used, — say the length of one revolution, — and that this is placed in the dead-wood. Such was the construction of the earlier screw-propellers, but now a still shorter portion of the screw is used; for instead of a complete turn of the thread, less than one sixth is now the common construction. Such a strip or segment of the screw-thread forms a *blade*, and two, three, four, or more blades are attached radially to one common axis. The blades spring, when there are two, from opposite points in the axis, and in other cases from points on the same circle. The blades of the propeller are cut and carved into every variety of shape according to the ideas of the designer, but the fundamental principle is the same in all the forms. It need hardly be said that the particles of the water are by no means fixed like those of the wood in which a screw advances. But as the water is not put in motion by the screw without offering some resistance by reason of its inertia, this resistance reacting on the screw operates in the same manner, but not to the same extent, as the wood in the other case. When we know the pitch of the screw, we can calculate what distance the screw would be moved forward in a given number of revolutions if it were working through a solid. This distance is usually greater than the actual distance the ship is propelled, but in some cases the vessel is urged through the water with a greater velocity than if the screw were working in a solid nut. The shaft which carries the screw extends from the stem to the centre of the ship where the engines are placed, and it passes outward through a bearing lined with wood, of which *lignum vitæ* is found to be the best kind, the lubricant for this bearing being not oil but water. The screw would not have met with the success it has attained but for this simple contrivance; for it was found that with brass bearings a violent thumping action was soon produced by the rapid rotation of the screw. The wearing action between the wood and the iron is very slight, whereas brass bearings in this position quickly wear and their adjustments become impaired. The screw-shaft is very massive, and is made in several lengths, which are supported in appropriate bearings; there is also a special arrangement for receiving the thrust of the shaft, for it is by this thrust received from the screw that the vessel is propelled, and the strain must be distributed to some strong part of the ship's frame. There is usually also an arrangement by which the screw-shaft can, when required, be disconnected from the engine, in order to allow the screw to turn freely by the action of the water when the vessel is under sail alone.

Screw-Wrench, a turn-screw; a bed-wrench.

Scribbling, a preliminary process to carding in the woollen manufacture.

Scribbling-Paper, rough foolscap or other waste-paper; outsides.

Scribe, a writer or clerk; a notary-public. — To mark and adjust with compasses; to score with scribing-iron.

Scribing Iron, an iron-pointed instrument for marking casks and logs of timber.

Scrip, an abbreviation of subscription, being the preliminary acknowledgment, or security, held for a certain amount paid up on a stock or share, which loses this distinctive term when the instalments are fully paid up, and the scrip is exchanged for a receipt in full. — A bond, share, or other marketable security.

Script, a schedule. — A kind of printing-type formed to imitate writing.

Scrivelloes, small elephants' tusks, those under the weight of 20 lbs.

Scrivener, an old term, still sometimes applied to a copyist, — one who copies deeds or legal papers.

Scroll, a roll of paper or parchment, or a writing formed into a roll; a first copy, or rough draught of anything; a schedule. — A mark or

flourish appended to a person's signature to a writing, and intended to take the place of a seal.—A kind of architectural ornamentation which resembles a band arranged in undulations or convolutions.

Scroll-Saw, a relatively thin and narrow-bladed reciprocating-saw, which passes through a hole in the work-table and saws a kerf in the work, which is moved about in any required direction on the table. The saw follows a scroll or other ornament, according to a pattern or traced figure upon the work. — *E. H. Knight.*

Scrow, a scroll. — Currier's cuttings or small clippings from skins. — The ears and other redundances used for making glue or size.

Scrub, dense underwood; stunted bushes. — To scour or rub hard; to clean by washing with a brush.

Scrubbing-Brush, a stiff brush used for scrubbing.

Scruple, a small weight used in compounding medicines, the third part of a drachm, and equal to 20 grains troy, and thus expressed symbolically ℈.

Scud, the name given by seamen to loose, vapory clouds driven swiftly along by the winds. *To scud*, signifies to run directly before the wind in a gale. As the object is to keep before the sea, the foresail or fore topsail is set: the latter or the main topsail is often necessary, as the foresail is often becalmed from the height of the waves.

Scudo, an old Italian silver coin, and money of account = $0.95.3.

Scuffler, an agricultural instrument for cutting up weeds; a horse-hoe.

Scull, an oar, so short that one can work a pair. It most generally implies an oar placed over the stern of a boat, and worked from side to side; the blade, which is turned diagonally, being always in the water.

Sculptor, a carver in wood or marble.

Sculptures, figures cut in marble, stone, metal, or other solid substances, representing or describing some real or imaginary object. The art of the sculptor, or statuary, was carried to the highest pitch of excellence in ancient Greece. Fortunately, several of the works of the Grecian sculptors have been preserved, and serve at once to stimulate and direct the genius of modern artists.

Scum, the refuse or extraneous matters that rise on the surface of heated liquors, or melted metal.

Scum-Boiler, a fat-melter, or tallow-chandler; one who refines the scum of sugar.

Scupper-Nail, a large-headed nail.

Scuppers, holes in the side of a ship, to carry off water from the main deck.

Scurf-Brush, a hard hair-brush; a curry-comb for a horse.

Scurvy-Grass, the *Cochlearia officinalis*, which is in repute for its antiscorbutic virtues.

Scutching. See FLAX (page 382).

Scuttle, a hole cut in any part of a vessel. — An iron or copper pan or vessel for holding coals for a room.

Scuttle-Butt, a cask with a hole cut in its bilge, and kept on the deck of a vessel to hold water for daily use.

Scythe, a long, sharp, curved instrument for cutting grass.

Scythe-Stone, a whetstone for sharpening gardening or reaping scythes.

Sea-Board, the coast; the sea-shore. — Impinging or bordering on the sea.

Sea-Boat, a term applied by seamen to a vessel with respect to her qualities in bad weather; as, a good, or bad, sea-boat.

Seafaring, following the occupation of a seaman; customarily employed in navigation or seamanship.

Sea-Fisheries. See FISHERIES in the Appendix.

Sea-Green, a color resembling the emerald green of the sea.

Sea-Horse Tooth, a name given to the teeth of the walrus, and of the hippopotamus, which yield ivory.

Seak, a preparation of the best mottled soap used in milling cloth.

Sea-Kale, an esteemed vegetable, the *Crambe maritima.*

Seal, a stone, piece of metal or other solid substance, generally round or elliptical, on which is engraved the arms, crest, name, device, etc., of some State, prince, public body, or private individual. It is employed as a stamp to make an impression on sealing-wax, thereby authenticating public acts, deeds, etc., or to close letters or packets.

Seal, the name of a family of marine carnivorous quadrupeds of which there are several species, one of which, the common seal, *Phoca vitulina* (see Fig. 8), is common on the coasts of New England, though it is in the Arctic regions that they chiefly abound. The seal is gregarious, and is fond of reposing on ice-fields, — situations where the greatest numbers are killed, chiefly for the oil obtained from their fat or blubber, which is preferred to that of the whale; though the animal is also valued for its skin, which is used, both with the hair on and when tanned into leather, for a variety of purposes. The seal-fishing is chiefly prosecuted from Newfoundland, Nova Scotia, and the most northern Atlantic and Pacific coasts of the U. States; but whalers always take out seal-clubs as part of their equipment, the animal being most readily despatched by a blow on the nose; and one ship has been known to obtain a cargo of from 4,000 to 5,000, yielding nearly 100 tons of oil. The gigantic walrus, belonging to the same class, is killed for its ivory tusks, as its carcass yields but a small proportion of oil; the chase of them, therefore, only constitutes a third-rate object in whaling voyages. See FUR.

Seal-Oil, oil obtained from the seal fisheries, which is of two kinds, pale or cold drawn, and boiled or dark oil. The blubber is suffered to drain, for two or three months, into wooden pans, and this furnishes the pale seal-oil of commerce, forming 50 to 70 per cent of the whole. The putrescent refuse, and the clippings of the pelts yield further quantities of dark oil by boiling. *Imp.* duty, 20 per cent.

Sealing-Wax [Fr. *cire à cacheter;* Ger. *Siegellack;* It. *cera lacca;* Sp. *lacre*], an adhesive resinous substance, made for sealing letters and documents, and covering the corks of bottles. All the higher-priced varieties are made of the best shellac and Venice turpentine colored red by vermilion, or black by ivory-black; the cheaper kinds are made of inferior materials. Sealing-wax has lost much of its importance since the introduction of gummed envelopes.

Seam, the suture or uniting of two edges of cloth by the needle; as to rip a *seam.* — Hence, the suture, joint, or line of juncture of planks in a ship's sides or deck; — also, the interstices between the edges of boards or planks in a floor; as, to calk the *seams* of a ship. — In England, a horse-

load of timber, about 3 cwt.; a trade term for 24 stone of glass = 120 lbs.

Seamen, the individuals engaged in navigating ships, barges, etc., upon the high seas. Those employed for this purpose upon rivers, lakes, or canals, are denominated watermen.

Of the Rights and Duties of Seamen. — The *S.* employed in the merchant service are made subject to special regulations prescribed by acts of Congress. Shipping articles are contracts in writing or in print, declaring the voyage and the term of time for which the *S.* are shipped, and when they are to render themselves on board; and the articles are to be signed by every *S.* or mariner on all voyages from the U. States to a foreign port; and, in certain cases, to a port in another State other than an adjoining one. If there be no such contract, the master is bound to pay every *S.* who performs the voyage the highest wages given at the port for a similar voyage within the next three preceding months, besides forfeiting for every *S.* a penalty of $20. — The *S.* are made subject to forfeitures if they do not render themselves on board to the contract, or if they desert the service; and they are liable to summary imprisonment for desertion, and to be detained until the ship be ready to sail. If the mate and a majority of the crew, after the voyage is begun, but before the vessel has left the land, deem the vessel unsafe, or not duly provided, and shall require an examination of the ship, the master must proceed to, or stop at the nearest or most convenient port, where an inquiry is to be made, and the master and crew must conform to the judgment of the experienced persons selected by the district judge, or a justice of the peace. If the complaint shall appear to have been without foundation, the expenses and reasonable damages, to have been ascertained by the judge or justice, are to be deducted from the wages of the *S.* But if the vessel be found or made seaworthy, and the *S.* shall refuse to proceed on the voyage, they are subjected to imprisonment until they pay double the advance made to them on the shipping contract. Fishermen engaged in the fisheries are liable to like penalties for desertion; and the fishing contract must be in writing, signed by the shipper and the fishermen, and countersigned by the owner. — The articles do not determine exclusively who are the owners, and the *S.* may prove by other documents the real and responsible owners. The object of the articles is to place the crew of a fishing vessel upon a footing with *S.* in the merchant service, and to make them liable to the same restrictions, and entitled to the same remedies. Provision is made for the prompt recovery of *S.*'s wages, of which one third is due at every port at which the vessel shall unload and deliver her cargo before the voyage be ended; and at the end of the voyage the *S.* may proceed in the District Court by admiralty process against the ship, if the wages be not paid within ten days after they are discharged. The *S.* having like cause of complaint, may all join in one suit, and they may proceed against the vessel within the ten days, if she be about to proceed to sea; but this remedy *in rem* does not deprive the *S.* of their remedy at common law for the recovery of their wages. — Every ship belonging to a citizen of the U. States, of a burden of 150 tons or upward, and navigated by six or more persons, and bound from any port in the U. States to any port in the West Indies, shall be provided with a medicine-chest, properly supplied with fresh and sound medicines; and, if bound on a voyage across the Atlantic Ocean, with requisite stores of water, and salted meat, and wholesome ship-bread, well secured under deck. A fund shall be raised out of the mariners' wages earned on board of any vessel of the U. States, and be paid by the master to the collector of the port on entry from a foreign port, at the rate of twenty cents per month for every *S.* The like assessment is to be made and paid on the new enrolment and license for carrying on the coasting trade, and also by persons navigating boats and rafts on the Mississippi. The moneys so raised are to be expended for the temporary relief of sick and disabled *S.* in hospitals and other proper institutions established for such purpose; and the surplus moneys, when sufficiently accumulated, shall be applied to the erection of marine hospitals for the accommodation of sick and disabled *S.* The hospitals, as far as it can be done with convenience, are to receive sick foreign *S.* on a charge of seventy-five cents per day, to be paid by the master of the foreign vessel. — And to relieve American *S.* who may be found destitute in foreign places, it is the duty of the American consuls and commercial agents to provide for those who may be found destitute within their consular districts, and for their passages to some port in the U. States, in a reasonable manner, at the expense of the U. States; and American vessels are bound to take such *S.* on board at the request of the consul, but not exceeding two men to every hundred tons burden of the ship, and transport them to the U. States on such terms, not exceeding $10 for each person, as may be agreed on. So, if an American vessel be sold in a foreign port, and her company discharged, or a *S.* be discharged with his consent, the master must pay to the consul or commercial agent three months' pay over and above the wages then due for every such *S.*, two thirds of which is to be paid over to every *S.* so discharged, upon his engagement on board of any vessel to return to the U. States, and the remaining third to be retained for the purpose of creating a fund for the maintenance and return of destitute American *S.* in such foreign ports. — The master is personally responsible in damages for any injury or loss to the ship or cargo by reason of his negligence or misconduct. He has authority to imprison, and also inflict reasonable corporal punishment, upon a *S.* for disobedience to reasonable commands, or for disorderly, riotous, or insolent conduct. If the correction be excessive or unjustifiable, the *S.* is sure to receive compensation for damages on his return to port in an action at common law. And it must be an extreme case that will justify a master to confine a *S.* in a common jail in a foreign port. He cannot do it as a punishment, but only by way of precaution under existing circumstances. The master may also confine a passenger who refuses to submit to the necessary discipline of the ship. The master has also the right to discharge a *S.* for just causes, and put him ashore in a foreign country; but the causes must be not slight, but aggravated; such as habitual disobedience, mutinous conduct, theft, or habitual drunkenness; and he is responsible in damages if he discharge him without just cause. This power of discharge extends to the mate and subordinate officers as well as the *S.* But it would require a case of flagrant disobedience, or gross negligence, or palpable want of skill, to authorize a captain to displace a mate, who is generally chosen with the consent of the owners, and with a view to the better safety of the ship and the security of their property. — The master must receive back a *S.* whom he has discharged, if he reports and offers to return to his duty and make satisfaction; and if the master refuses, or the *S.* has been unduly discharged, he may follow the ship, and recover his wages for the voyage, and his expenses for his return. The master subjects himself to fine and imprisonment if, without justifiable cause, he maliciously force an officer or mariner on shore while abroad, or leave him behind in any foreign port or place, or refuse to bring home those whom he took out, and are in a condition and willing to return. The expense of curing a sick *S.* in the course of the voyage is a charge upon the ship in the nature of additional wages during sickness. — The act of Congress requires that in *S.*'s shipping articles the voyage and the term of time for which the seamen may have shipped be specified. The regulation relates to voyages *from* a port in the U. States, and it does not apply to a voyage commencing from a foreign port to the U. States. The voyage within the intention of the statute means one having a definite commencement and end. The *terminus a quo* and the *terminus ad quem* must be stated precisely, and in a case of general adventure the term of service must be specified. A voyage from New York to the Curaçoa and elsewhere means, in shipping articles, a voyage from New York to Curaçoa, and the word *elsewhere* is rejected as being void for uncertainty. *S.* in the merchant service are usually hired at a certain sum, either by the month or for the voyage. In the fishing trade the *S.* usually serve under an engagement to receive a portion of the profits of the adventure. The share or profits of the voyage are a substitute for regular wages, and the act of Congress (June 19, 1813) extends the admiralty jurisdiction to the cognizance of suits for shares in whaling voyages in the same form and manner as in ordinary cases of wages in the merchant service. Every *S.* engaged to serve on board a ship is bound, from the nature and terms of the contract, to do his duty in the service to the utmost of his ability; and, therefore, a promise made by the master when the ship is in distress, to pay extra wages as an inducement to extraordinary exertion, is illegal and void. It would be the same if some of the crew had deserted, or were sick or dead, or peculiar efforts became requisite; for the general engagement of the *S.* is to do all they can for the good of the service under all the emergencies of the voyage. — A *S.* is entitled to his whole wages for the voyage, even though he be unable to render his service by sickness or bodily injury happening in the course of the voyage, and while he was in the performance of his duty. He will equally be entitled to his wages to the end of his voyage when wrongfully discharged by the master in the course of it. The marine law distinguishes between the cases in which *S.*'s services are not rendered in consequence of a peril of the sea, and in which they are not rendered by reason of some illegal act, or misconduct, or fraud of the master or owner interrupting and destroying the voyage. In the latter cases the *S.* are entitled to their wages. If a *S.* be wrongfully discharged on the voyage, the voyage is then ended with respect to him, and he is entitled to sue for his full wages for the voyage. — Freight is the mother of wages, and if no freight be earned no wages are due; but the freight must not be lost by the fraud or wrongful act of the master. The rule applies to cases of loss of freight by a peril of the sea. *S.*'s wages in trading voyages are due *pro rata itineris.* If the *S.* dies on the voyage, it was decided in the Circuit or District Court of the U. States in Pennsylvania that the representatives were entitled to full wages to the end of the voyage; and on the other hand, in the District Court of South Carolina and Massachusetts, it was decided that full wages by marine law meant only full wages up to the death of the mariner. As the payment of wages depends, in general, upon the earning of freight, if a ship delivers her outward cargo, and perishes on her return voyage, and the outward freight be earned, the *S.*'s

wages on the outward voyage are consequently due. — By the custom of merchants, *S.*'s wages are due at every delivering port, and their wages are not affected without their special agreement, by any stipulation between the owners and the charterers, making the voyages out and home one entire voyage, and the freight to depend on the accomplishment of the entire voyage out and in. The owners may waive or modify their claim to freight as they please, but their acts cannot deprive the *S.*, without their consent, of the rights belonging to them by the general principles of the marine law. They are entitled to wages not only when the owner earns freight, but when, unless for his own act, he may earn it. The wages are due by an arrival at a port of destination, when no cargo is on board, or when the owner chooses to bring the cargo back again, and when the port of destination be not, in fact, the port of delivery. Even if the ship perishes on the outward voyage, yet, if part of the outward freight has been paid, the *S.* are entitled to wages in proportion to the amount of the freight advanced, for there is an inseparable connection between freight and wages. In case of capture, the *S.* taken prisoners by the captor and detained are entitled to their wages for the whole voyage, if the same be afterward performed, with a ratable deduction for the expenses of salvage. The same is the case of a vessel captured and afterward ransomed, and enabled to arrive at her port of destination. In the case of shipwreck, if any proportion of freight be paid for the cargo saved, wages of *S.* are to be paid in the same proportion. — Mariners are bound to contribute out of their wages for embezzlements of the cargo, or injuries produced by the misconduct of any of the crew. But the circumstances must be such as to fix the wrong upon some of the crew; and then, if the individual be unknown, those of the crew upon whom the presumption of guilt rests, stand as sureties for each other, and they must contribute ratably to the loss. Where the embezzlement has arisen from the fault, fraud, connivance, or negligence of any of the crew, they are bound to contribute to the reparation of the loss, in proportion to their wages. Where no reasonable presumption is shown against their innocence, the loss must be borne exclusively by the owner or master. — In case of shipwreck, and there be relics or materials of the ship saved, the *S.* by whose exertions part of a vessel had been saved, are allowed the payment of their wages, as far as the fragments of the materials would form a fund, although there was no freight earned by the owners. But in such cases, where the voyage is broken up by *vis major*, and no freight earned, no wages *eo nomine* are due; and the equitable claim which *S.* may have upon the remains of the wreck is rather a claim to salvage than a title to wages. Wages in such cases would be contrary to the principle of marine law — that freight is the mother of wages, and the safety of the ship the mother of freight. If, however, the *S.* abandon the wreck of a ship, as being a hopeless case, and without the intention of returning to possess and save it, they lose their lien or privilege for any equitable compensation, whether as wages or salvage — their claim is extinguished; and though other persons may possess the property which has been derelict, it belongs to the original owner, burdened for their claim for salvage.

Sea-Mile, the marine or geographical mile, the 60th part of a degree; it is often, however, applied to the marine league, or the 20th part of a degree. See MILE.

Seaming-Lace, a coach-maker's lace, used to cover seams and edges.

Sea-Morse Teeth, a name for the canines or tusks of the hippopotamus, and which supply the most suitable ivory for the dentist.

Seam-Presser, an abstract of a drill-roller, consisting of two cylinders of cast-iron, which, following the plough in the furrows, press and roll down the newly turned-up earth.

Sean, SEINE, a large net for taking pilchards and herrings, varying from 200 to 300 fathoms in length, and from 10 to 14½ fathoms in depth, and having cork buoys on one edge, and lead weights on the other. *Imp.* duty, 6¼ cts. per lb.

Seaport, a port or harbor near the sea, formed by an arm of the sea, or by a bay or river; a city or town situated on a harbor or haven, by or near the sea.

Sear, the catch in the lock of a gun, by which the piece is held at cock, or half-cock.

Seasoned Lumber, planks, boards, or other lumber rendered dry and hard by being penetrated with other substances, or divested of their natural juices or sap, either by artificial heat or by long exposure to the sun and air.

Seat, a chair, couch, or bench. — A country house.

Seating, horse-hair fabric, American leather, or other materials, made for covering the cushions of chairs, couches, etc.

Sea-Wall, an embankment on the shore to keep off the encroachments of the tide.

Sea-Weed, the common name of marine plants comprising the order *Fucaceæ*, many of which enter largely into commerce for food, for manure, for making glue or jelly, for barilla or iodine, as a source of acetic acid, etc.

Seaworthy, a term applied to a ship, indicating that she is in every respect fit for her voyage.

It is provided in all charter-parties that the vessel chartered shall be "tight, stanch, and strong, well apparelled, furnished with an adequate number of men and mariners, tackle, provisions," etc. If the ship be insufficient in any of these particulars, the owners, though ignorant of the circumstance, will be liable for whatever damage may, in consequence, be done to the goods of the merchant; and if an insurance have been effected upon her, it will be void. But whether the condition of seaworthiness be expressed in the charter-party or not, it is always implied. A ship is not *S.* unless she be provided with all the documents or papers necessary for the manifestation of the ship and cargo. Neither is she *S.*, if during war, she be not supplied with the sails required to facilitate her escape from an enemy. It is not sufficient to defeat the liability of the owner that he did not know that the ship was *not S.*, for he ought to have known that she was so at the time he chartered her. The sufficiency of the ship is the foundation of the contract between the parties, and a ship not capable of conveying the goods in a proper state is a failure of the condition precedent to the whole contract. The seaworthiness of the ship is not a question of fraud or good intention, but it is a positive stipulation that the ship shall be so; and therefore, although the owner may himself have been deceived by the shipbuilder, repairer, etc., if the vessel be, in fact, unseaworthy, have an insufficient bottom or unsound timbers, it is a breach of a preliminary condition, and is fatal, as such, to the contract. It is only necessary to guarantee the owners from loss, that the ship should be *S.* at the time of her departure. She may cease to be so in a few hours, and yet they may not be liable. The question to be decided in such cases always is, whether the ship's disability arose from any defect existing in her *before* her departure, or from a cause which occasioned it *afterward.* But if a ship, within a day or two of her departure, become leaky or founder at sea, or be obliged to put back, without any visible or adequate cause to produce such an effect, — such as the starting of a plank or other accident, to which the best ships are liable, and which no human prudence can prevent, — the fair presumption is that she was not *S.* when she sailed; and it will be incumbent on the owners to show that she was *S.* at that time. They are liable for damage occasioned by every injury arising from any *original defect* in the ship, or from bad stowage; but they are not liable for any injury arising from the act of God, the nation's enemies, or the perils of the sea. It is further to be observed, that how perfect soever a ship may be, yet if, from the nature of her construction, or any other cause, she be incapable of performing the proposed voyage, with the proposed cargo on board, she is not *S. She must be in all respects fit for the trade in which she is meant to be employed.* And it is a wholesome rule that the owners should be held to a pretty strict proof of this. It has been already observed that any defect in point of seaworthiness invalidates an insurance upon a ship. There is not only an express but an implied warranty in every policy that the ship shall be "tight, stanch, and strong," etc.; and the reason of this is plain. The insurer undertakes to indemnify the insured against the *extraordinary and unforeseen perils of the sea*; and it would be absurd to suppose that any man would insure against those perils, but in confidence that the ship is in a condition to encounter the *ordinary perils* to which every ship must be exposed in the usual course of the proposed voyage.

Second, a measure of time of the 60th part of a minute, and represented thus ″. It is also an English petty linear measure, the 12th part of a line; in Switzerland the 10th part of a line; in Germany the 10th part of the primo, or the 100th part of the inch.

Secondaries, those quills which rise from the second bone of the wings.

Second-Hand, not new or original; articles of clothing, furniture, etc., that have been used.

Second Quality, merchandise of less commercial value than the best kind of the same article.

Seconds, a kind of household flour manufactured from general runs of red wheat, and the flour made from sharps ground. — A quality designation for cigars, — those made from the same lot of tobacco, before being packed in boxes, are sorted and separated, according to their external appearance, into firsts, *seconds*, and thirds, the seconds being less valuable in trade than firsts, and more valuable than the thirds.

Secretage, the application of a solution of nitrate of mercury with a sponge to rabbit skins, and the fur of other animals, to communicate the property of felting which they do not possess.

Secretary, a person employed by a public body, a company, or an individual, to write orders, letters, despatches, records, public or private papers, or the like; an official writer; an amanuensis; as, a private *secretary*. — A public official whose business it is to superintend and manage the affairs of a particular department of government; as, a *Secretary* of State, the *Secretary* of the Treasury, etc. — A font of type in imitation of an engrossing hand.

Secret-Springer, one who puts in watch-springs.

Section, an interior vertical plan of a building. — An indefinite portion of land. — A railroad cutting.

Sector, a mathematical instrument used in making diagrams and laying down plans.

Security, anything given or deposited to secure the payment of a debt, the performance of a contract, or the fulfilment of an obligation; surety; guarantee; a pledge; something given or done to secure peace or good behavior. — Also, one who becomes bond or surety for another's debt or obligation; as, they fell back on his *security*. — An evidence of debt or proof of property, as a bond, coupon, debenture, certificate of stock, etc.; generally in the plural; as, government *securities*.

Security, a fire and fire-marine insurance Co., located in New Haven, Conn., organized in 1841. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $9,173. Risks in force, $14,270,403; premiums, $160,851. Premiums received since the organization of the Co., $2,481,229; losses, $1,747,443; cash dividends paid to stockholders, $272,281.

Sedan-Chair, a portable seat or hand-carriage for one person, carried by two footmen or bearers, with poles.

Sediment, feculencies or refuse; a deposit of lees or dregs.

Sedulas, a Brazilian money. See BRAZIL.

Seed-Grain, wheat, barley, rye, oats, Indian corn, or other cereals, clean, and carefully selected for seed, for which a higher price is usually obtained than for ordinary merchantable grain.

Seed-Lac, small fragments of lac-resin, from which the coloring matter has been removed by boiling.

Seed-Oil, an indefinite name for several kinds of oil, which enter into commerce. They are given under their specific names.

Seed-Planter, a sowing-machine, of which there are many varieties. See also DRILL.

Seeds, in commerce, the grains of several species of gramina. Those of most importance are clover-seed, cotton-seed, flax or linseed, hemp-seed, rape-seed, tares, mustard-seed, etc.; for which, see the respective articles. The value of our imports of seeds for the year 1879 was $2,213,837 (in which linseed entered for $1,613,001); of exports, $2,213,-837.

Imp. duty: agricultural or garden seeds, n. o. p. f., 20 per cent; oil-seeds of like character with hemp and rape, excepting flax or linseed, ½ cent per lb.; seeds for manufacturing purposes, n. o. p. f., free.

Seedsman, a dealer in agricultural and garden seeds.

Seer, a variable weight of India, of which 40, however, usually go to the mansid. It ranges from 3,580 grains up to 35,650 grains. The East India Company's new seer of 80 tolas = 2.057 lbs. avoirdupois. The Calcutta factory seer is equal to 72 sicca weight, 11 annas, 2 puns, 10 gundas, and 3.63 cowries. The best Indian authorities give the Indian seer as 14,400 grains = 2.057 lbs. avoirdupois, and the tola 180 grains.

Seerhand, a kind of muslin, between nainsook and mull, particularly adapted for dresses, retaining its clearness after washing.

Segar or CIGAR. See TOBACCO.

Seggar. See SAGGAR.

Segment, a part cut off or divided; a portion of a circle.

Seidlitz, an aperient powder, composed of equal parts of bicarbonate of soda and Rochelle salts, which is taken dissolved in water; tartaric-acid being added to make it effervesce.

Seigle, the French name for rye.

Seine. See SEAN.

Seizain, a sort of cloth of 1,600 threads.

Seize, to fasten ropes together by turns of small stuff.

Sell, to dispose of; to vend or traffic.

Sellier, a French saddler.

Selling Out, disposing of the stock on hand without making new purchases to keep up the supply or assortment. The phrase usually implies an intention to close up and abandon the business.

Seltzer-Water, a mineral water; saline and slightly alkaline, and highly impregnated with carbonic acid.

Selvage, SELVEGE, the edge of anything; a skein of rope-yarns or spun-yarn twisted together, used as a neat strap.

Semaine, the French name for a week or seven days.

Semencine, SEMEN CONTRA, names for the *Artemisia Sieberi*, and some allied species, the leaves and flower-heads of which are a celebrated remedy for worms. The vermifuge properties of this celebrated medicine reside in a volatile oil and resinous extract. See SANTONINE.

Seminary, a school for the young.

Semola, an Italian name for bran; but often erroneously applied by grocers, and other venders, to semolino.

Semolino (It.), small seed; grains of rice; a kind of paste for soups. The commercial name for the fine hard parts of wheat, rounded by attrition in the millstones, imported chiefly from Italy to a large extent. In France, the name semoule is given to the large hard grains of wheat retained in the bolting-machine, after the fine parts have been pressed through its meshes. With the semoule or gruau the fine white Parisian bread is made. The best semolino is obtained from the wheat of the *S.* parts of Europe.

Sendal, a thin kind of silk.

Senegal, a French colonial establishment on the W. coast of Africa, comprising several islands and small portions of the African continent between the Senegal and Gambia Rivers, including the island and town of St. Louis at the mouth of the Senegal, and Goree, off Cape Verd. The soil is sandy along the coast, but very fertile inland. The

climate is unhealthy. The commerce is almost exclusively in the hands of the French. The exports amount in average to about $2,500,000; the imports to $1,400,000. Pop. 100,000.

Senegal (Gum). See GUM.

Senegal-Root, a name for the diuretic and very bitter root of *Cocculus bakis;* used in intermittents, and in gonorrhœa.

Seneka-Root, CANADA SNAKEROOT, the root of *Polygala Senega*, a native of the United States, which is diaphoretic, diuretic, and expectorant. It was introduced into medical practice as a remedy in snake bites; but its efficacy in the treatment of these accidents is very questionable. *Imp.* duty, 20 per cent.

Fig. 441. — AMERICAN SENNA.

Senna [Arab. *suna;* Fr. *séné;* Ger. *Sennablader;* It. *senna;* Sp. *sen*], the leaflets of several species of *Cassia*, used in medicine for their purgative properties. *C. elongata* and *C. acutifolia* furnish the Tinnevelly and Alexandrian senna, which are the best. The latter constitutes the bulk of the imports into Europe. It is much adulterated with the leaves of *Cynanchum arghel, Tephrosia apollinea*, and *Coriaria myrtifolia*. The leaves of the American or wild senna, C. *marilandica* (Fig. 441) are used for the same purpose, but its properties are less active.

Sennit, a seaman's term for a coarse yarn or line for making rope; rope-yarns plaited, or flat-braided cordage; plaited straw or palm leaves, etc., of which grass hats are made.

Sepeck, the current coin of Cochin China, cast of a compound brittle metal called tutenag, the base of which is zinc. It is about the size of a shilling, and pierced with a square hole, by which they are strung in numbers together; and as they are the only coin used, they form a very bulky and inconvenient medium; 60 sepecks are equal to one mas, an imaginary coin worth about 5 cents; and 10 mas make a quan.

Sepia, a brown color originally obtained from the ink-bag of a species of cuttle-fish.

Sepia Drawing, a neutral-tinted picture colored with sepia.

Septaria, nodules of chalky marl, the well-known basis of Roman cement.

Sequin, an old Italian or Turkish coin. The Tuscan sequin was worth $2.313; the Turkish, according to dates, from $1.85 to $1.90.

Serafina, a sort of swan-skin used for waistcoats.

Seraphine. See HARMONIUM.

Serge, a cloth of quilted woollen.

Sergette, a thin and slight serge.

Sericeous, silky; having a soft, smooth surface like silk; covered with silky hairs, as a leaf.

Seringa Oil, an oil obtained in Brazil from the fruit of the borracha, *Siphonia elastica.*

Seron, SEROON. See CEROON.

Serpent, a kind of firework. — A brass musical wind-instrument, something like a serpent in its convolutions, chiefly used in military bands.

Serpentary-Root, SNAKEROOT. See ARISTOLOCHIA.

Serpentine. See MARBLE.

Serpette, a curved knife for pruning.

Serrated, notched; edged like a saw.

Serrurier, a French locksmith.

Servant, a household domestic; a farm laborer; a menial.

Servia, a principality of southeastern Europe, whose independence from Turkey was established by the treaty of Berlin in 1878. It is chiefly situated between lat. 42° to 45° N., lon. 19° 20′ to 22° 50′ E. Its area, previously to the year 1878, was computed at 16,600 sq. m. with a pop., according to a census taken Dec. 31, 1874, of $1,352,522, comprising 694,756 males and 657,766 females. By the terms of the Treaty of Berlin, there was annexed to Servia a territory, formerly belonging to Turkey, of 4,250 sq. m., with 367,000 inhabitants, raising the total area of the principality to 20,850 sq. m., with a pop. of 1,719,522. The great majority of the inhabitants are Servian Slavonians, but in the district annexed in 1878 there are estimated to be 75,000 Mahometans. *Belgrade*, the capital, has a pop. of 27,605. — The chief trade of Servia is with Austria, Turkey, and Roumania. The trade of the principality is represented by imports from Austria and Turkey of the annual value of $4,500,000, and exports to the same countries, of $5,500,000. The chief article of export is live animals, particularly pigs. The latter, which are kept in countless herds, feeding on the acorns which cover the ground for miles, are driven in large quantities into Hungary and adjoining parts of Austria. The commercial resources of Servia are as yet wholly undeveloped, chiefly for want of roads.

Money, Weights, and Measures. — The official accounts are kept in "tax-piastres," 50 of which = $5. The circulating coin consists chiefly of Austrian and Russian currency. The usual weights and measures adopted by the people in their transactions are those of Turkey, and in foreign trade those of Austria.

Service, duty or employment, public or private. — A set of dishes and plates. — An assortment of table linen. — A seaman's term for layers of spun-yarn placed round a rope to protect it from friction.

Service-Pipe, the junction or connecting pipe attached to water and gas mains leading to private houses, etc.

Serviette [Fr.], a table napkin.

Serving, the process of binding or casing a cable or large rope with canvas or spun yarn, to prevent friction or wearing in parts which are much exposed.

Serving-Board, SERVING-MALLET, a mallet-shaped tool used by sailors and riggers in winding tarred yarns around large ropes to protect them from friction or from undue wear.

Sesame, a plant, the *Sesamum orientale*, universally cultivated in the East Indies for the oil expressed from its seeds, which is also known in India as *teel, gingelly*, or *gingillic oil.* It is rarely imported, as it soon becomes rancid; but it is said

to be largely employed for adulterating almond-oil. *Imp.* free. (Seeds and oil.)

Set, a complete assortment.

Set-off, a counterbalance; one demand placed against another.

Seton, some fibre passed through the skin of an animal by a large needle, to make and continue an opening.

Settee, a large, long seat with a back.—A lateen-rigged vessel in the Mediterranean.

Setter, a useful sporting dog, the *Canis index*, trained to sit or crouch to the game he finds.

Setting-Coat, the best kind of plastering.

Settlement, the payment of a bill; the arranging or closing mercantile transactions; balancing of cross accounts.—The dregs or feculencies deposited in liquors.—A new colony or township.

Settler, one who locates on new land.

Settling-Day, the prompt-day in the produce market; the half-monthly account-day for shares and stocks on the stock-exchange.

Seve, a French term for the aroma in wine.

Sevoeja. See CEBADILLA.

Sèvres Ware. See PORCELAIN.

Sewed Muslin Manufacturer, a preparer of needle-work or embroidery.

Sewing-Clamp, a device for holding a piece of leather work while being stitched.

Sewing-Cotton, threads made from cotton yarn and spooled. The spools are supposed to contain 100, 200, or 500 yards, and are numbered from the coarsest to the finest. The threads are made single in 3 cord, and in 4 and 6 cord cabled, the latter of which are the best qualities. When the thread is sold in hanks or skeins, it is numbered from the yarn from which it is made, say from 21 yarn up to 200 yarn. The principal manufactures of sewing cotton are at Paisley, in Scotland, and at Newark, New Jersey.—*T. McElrath.*

Sewing-Machine, a labor-saving machine for stitching, adapted, according to its construction, for sewing or stitching woollen, linen, leather, etc.

There are few inventions of recent date which have been brought into use more rapidly and extensively. The patents for sewing-machines are so numerous, and the inventions patented are often so complex, that the whole subject is an embarrassing one to most readers. Nevertheless, the working depends on a few simple principles. If we watch a needle-woman in the various processes called by her sewing, stitching, felling, hemming, running, tucking, basting, whipping, etc., we see different modes of thrusting a threaded needle through the cloth, and of entangling the thread in its own loops on one or both sides of the cloth. The machines imitate more or less closely the movements by which all this is done,—some of them attempting only a few of the movements, some attempting all. The *running* stitch, the *loop* stitch, the *chain* stitch, the *lock* stitch are among many kinds of looping which have one by one been brought within the scope of the machine. The machines have sometimes been classified into two groups,—the *single-thread* and the *double-thread*. Another classification is into four groups,—those which send the needle completely through the cloth; those which hook the thread into a chain-stitch by a sort of crochet needle; those which form a loop by a second thread carried across the first by a sort of shuttle; and those which form a tightly compacted chain-stitch of two threads. Some of the machines are worked by pedal or foot-lever, while others have a hand-turned wheel as a substitute. Many machines to perform various kinds of tambour and embroidery-work were invented before any of the sewing-machines usually so called, although they really employed mechanism to carry one or more needles through the cloth. The sewing-machine, however, does not imitate those (see EMBROIDERY) in working many needles at once; its efficacy consists mainly in the very rapid movements of *one* needle, or, for some kinds of stitch, *two*. From the time when Elias Howe patented his first sewing-machine, in 1846, variations in the mode of producing these movements have been the chief subjects of the patents. As to the rivalry between inventors, it has been productive of much benefit, each finding out something which had escaped the notice of his predecessors. There is no *best* sewing-machine; each has its own merits for particular kinds of service. It would be out of place here to describe the minute details and modes of action of the sewing-machines; so numerous and intricate are the needles, needle slides, feed motions, vibrating and other levers, cams and cam grooves, supply wheels, driving pulleys, shuttles, bobbins, thumb-screws, rocking levers, elastic springs, thread-lifters, slotted movable pieces, rotating loop-hooks, etc.; and every different machine has its own particular selection of these working parts. In some of the machines trimmings can be sewed at the rate of a yard a minute. Some are specially fitted for general outfitting and boot and shoe work. Some for finer work can make the enormous number of 3,000 stitches in a minute. Some will stitch the uppers to the soles of 150 pairs of boots or shoes in a day. Sewing-machines are perhaps more extensively exported than any other article of our national industry. For the year 1879, the value of exports to all parts of the world was valued at $1,648,914,—in which total, Germany enters for $563,910; England, $334,269; Mexico, $158,424; Australia, $118,671; and the U. States of Colombia, $103,879.

Sewing-Press, the frames, with stretched vertical cords, against which the backs of the folded sheets of a book are consecutively laid and sewed.

Sewing-Silk, doubled silk threads, or compound threads of silk specially prepared to use for sewing with the needle. For the convenience of consumers it is put up in small skeins or on small spools. It is one of the branches of silk manufacture which has been successfully carried on in this country for many years, the American sewing-silks equalling in quality those of any other country.—*T. McElrath.*

Sextant, an instrument for measuring the angular distances of objects by reflection. It is capable of very general application; but it is chiefly used as a nautical instrument for measuring the altitudes of celestial objects, and their apparent angular distances. It is an instrument of the utmost importance in navigation.

It consists (Fig. 442), of a graduated limb, A, A, forming about the sixth part of a circle (whence the name *sextant*). Two glass mirrors, B, C, adjusted to it perpendicularly to its surface, have for object to reflect the rays of light coming from the objects under observation. D, E is a telescope, which collects and transmits to the eye the rays of light emanating from the small mirror, C. This little mirror is fixed on the sextant; while the large mirror, B, can turn round the centre of the limb, with the alidade, F, of which it forms a part. An index and a vernier, placed at the extremity of the alidade, permit to read

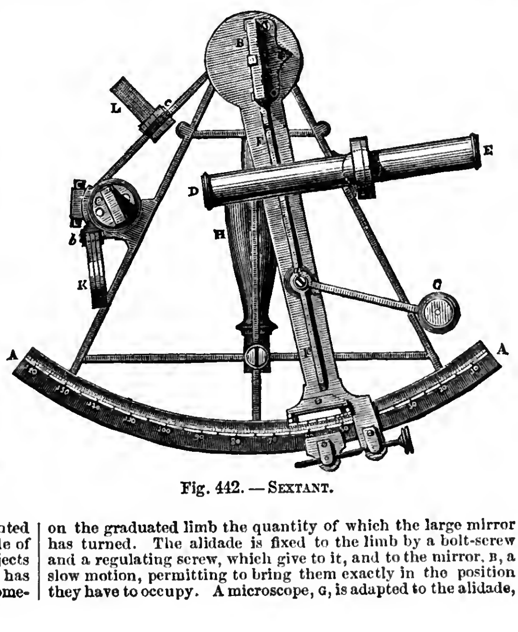

Fig. 442.—SEXTANT.

on the graduated limb the quantity of which the large mirror has turned. The alidade is fixed to the limb by a bolt-screw and a regulating screw, which give to it, and to the mirror, B, a slow motion, permitting to bring them exactly in the position they have to occupy. A microscope, G, is adapted to the alidade,

F, at the extremity of an arm which can turn round the point *a*, so as to bring it above the divisions of the vernier. H is the handle, attached to the back of the frame. When observing altitudes, the instrument is held perpendicularly to the horizon, in observations in the plane of the line joining the two objects. In taking noon observations at sea to determine the latitude, the observer takes his place shortly before meridian, and turning down one or several of the shades to prevent his eye being injured by the glare, directs the telescope or sight-tube to the sun, moving the index so as to bring its reflected image to coincide with the sea horizon; as the sun rises, he gradually advances the limb, clamping it and using the regulating-screw for this purpose, as the sun's path becomes more nearly horizontal, and slightly rocking the instrument from side to side to insure that it is in a vertical plane at the moment when the sun attains his greatest height. The reading of the limb at the moment when the sun begins to dip is noted, and a very simple calculation, adding his declination derived from the "Nautical Almanac" to the true zenith distance obtained by observation, gives the latitude.

Shabby, damaged or faded; articles not new.

Shackles, links in a chain cable, fitted with a movable bolt, so that the chain can be separated. — Iron fetters for the legs of prisoners, slaves, etc.

Shad, a fish of the genus *Alausa*, distinguished from the herrings by a deep notch in the middle of the upper jaw, and by the roof of the mouth and the tongue, which are destitute of teeth. *A. prestibilis*, the American shad, is about 20 in. long. They come from the S. to deposit their spawn, running up the rivers from the sea; they appear at Charleston in January, at Norfolk in February, at New York by the end of March, at Boston by the end of April, and in the Bay of Fundy by the middle of May. New York is mainly supplied from the Delaware and Hudson Rivers. The shad fishery is prosecuted by drift and stake nets, and its commercial value is considerable. The fish is with us mostly eaten fresh. It is delicious when just from the sea, but its innumerable bones are a great drawback.

Shaddock, sometimes called the "forbidden fruit," a West Indian fruit with a thick rind, the *Citrus decumana*, resembling a very large orange, but of very inferior quality.

Shade, a screen or sun-blind. — A hollow glass cover for enclosing and protecting ornaments. — A tint in painting.

Shadoof. See EGYPT, page 311.

Shaft, an engineering name for a large axle of machinery, a small one being termed a spindle. — The pole of a carriage. — The handle of a weapon. — An arrow. — The vertical access to a coal or other mine.

Shafting, the principal means in a machine-shop for the transmission of power. It serves to convey the force which is generated in the engine to the different working-machines, for which purpose it is provided with drums and belts, or else cog-wheels firmly keyed on. — *E. H. Knight.*

Shag, a kind of cloth with a coarse nap; rough, woolly hair.

Shagreen [Fr. *chagrin;* Ger. *Schagrin;* Rus. *schagrim*], a sort of hard grained leather, prepared in a peculiar manner from the skin of horses and other animals; the part preferred being the piece above the tail. It is made in Poland; Russia, especially at Astrachan; and in various parts of the Levant. The best is said to be imported from Constantinople. It is employed in the manufacture of small cases and boxes.

Shag-Tobacco, a very strong, dark kind of tobacco, cut into fine threads, used both for chewing and smoking, which acquires its color from being soaked or liquored.

Shale, indurated slaty clay. From bituminous shale a variety of commercial products is now obtained.

Shalloon, a loosely made woollen stuff, commonly used for lining coats.

Shallop, a large two-masted schooner-rigged boat; a light vessel with lug sails.

Shallot, a species of pungent small onion, the *Allium ascalonicum*, used in cooking, for flavoring or seasoning food.

Shambles, a slaughter-house.

Shammy, a common mode of writing or expressing chamois or oiled leather. See CHAMOIS-LEATHER.

Shampooer, a person in connection with the hot bath, who rubs the body and extends the limbs.

Shanghai. See CHINA.

Shank, a double hand-ladle, capable of holding 2 to 4 cwt. of melted metal, carried in foundries by from three to five men; a part of type. — The long part of a key or other instrument. — The main piece of an anchor, the long iron bar, connecting the flukes or arms with the stock.

Shankbone, the long bone of the leg of animals, which are used for various purposes.

Shank-Painter, a rope or chain for securing the shank of the anchor to the ship's side.

Shape, form or figure. — A pattern. — A mould or cast, as a jelly shape, etc.

Share, a part or portion, as of the property or stock in a joint-stock company. — The cutting part or metal blade of a plough. — To divide.

Sharebroker, a dealer in railway or other shares and securities.

Shareholder, one who owns a share in a joint fund or property.

Shark, a popular name for several species of *Squalus*, a voracious fish. The skin of some species is used by native workmen in India for polishing wood and ivory, and is made into shagreen. The dried fins are sent to China, where they are esteemed a food delicacy. A large quantity of oil is also obtained from the livers.

Sharp, a term applied to instruments having a fine edge or thin point; also to vegetable substances which have a sour or acid flavor; also to a man who is close and exact in dealing, — the term conveying the idea of shrewdness beyond the limit of fair dealing.

Sharps, a miller's name for the hard parts of the wheat, which require grinding a second time. By some millers, sharps are called middlings.

Shave, a drawing knife used by coopers. — To cut off thin slices. — To clear the face of hair with a razor. — To discount a draft or note at an exorbitant rate of interest, but in such a manner as to evade the laws against usury.

Shave-Hook, a steel tool used by plumbers to scrape the lead round a joint previous to soldering.

Shavings, thin slices of wood, stripped off with a knife, plane, or other cutting instrument.

Shawl, an article of fine wool, silk, or wool and silk, manufactured after the fashion of a large handkerchief, used in female dress. The principal varieties of shawls are: those of Cashmere, woven in India or imitated in Europe and also in the U. States, where they were first manufactured at Lowell, Mass. (see CASHMERE SHAWLS); crape shawls (see CRAPE); grenadines, made of silk of a peculiar kind; chenilles, made of silk, or silk and cotton; chiné, made with a warp printed before weaving; barege (see BAREGE); tartan plaids; and woollen shawls of various kinds. At present, owing to the caprice of fashion, shawls are much less worn than formerly.

Shea Butter, a solid fat obtained in Africa from the seed of *Bassia Parkii.*

Sheaf, a bundle of corn bound up in the field.— A bunch of 24 arrows.—A quantity of iron or steel.

Shealings, a name for the coarse husks of oats, taken off between mill-stones before the grain is kiln-dried in preparation for being ground into meal.

Shear, to clip or cut close, as the fleece of wool.— The nap of cloth, etc.— To nap.

Shearer, one who clips the fleece of wool.— A workman who cuts or trims plates or sheets of iron.

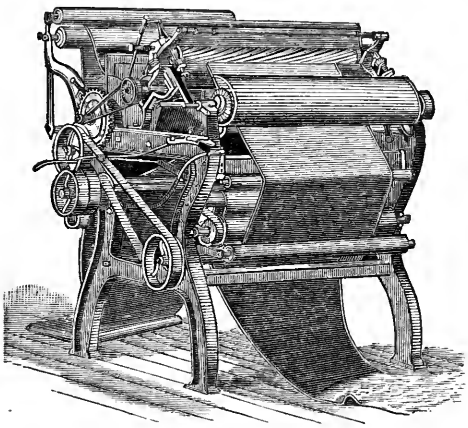

Fig. 443. — Shearing Machine.

Shearing Machine. In woollen-cloth manufacture, after the fibres have been entangled into a kind of felt by *fulling*, and raised into a kind of pile by *teazling*, they are cut into a beautifully smooth soft nap by *shearing*. This was formerly done by hand, men using large shears in a very dexterous way; but now an admirably devised shearing machine is employed. Here there is a flat, thin wheel, having eight very sharp disks of steel attached to its surface, close to its circumference. The wheel rotates; the disks rotate on the wheel; and there is thus a kind of planet motion combined with satellite motion. The cloth is spread flat on a table; a half-ring plate is laid upon it, with the concave edge made very sharp, and the action is such that the fibres of the pile, caught between the keen edge of each disk and the keen edge of the plate (as between the blades of a pair of scissors), are cut or sheared. The disks pass many times over the surface, cutting off a minute portion of pile each time. Shearing machines of different construction are sometimes used for the back of the cloths. Fig. 443 represents a similar machine intended for shearing Brussels, Axminster, tapestry, and ingrain carpets.

Shearing Steel, a process of welding, or heating and hammering several pieces upon each other, to form a dense, compact, and tough mass, from which blister steel is made.

Shearling, a sheep that has been once shorn.

Shears, cutting instruments, large, strong scissors, of which there are different kinds, as for shearing sheep, and for clipping hedges, etc. See Sheers.

Shear-Steel. See Steel.

Sheath, a case for a knife; a scabbard for a sword.

Sheathing. Among the numerous substances tried for protecting ships' bottoms from the attacks of marine animals, *lead* was for a long time used; then *copper;* but now *sheathing-metal* is made for the purpose, an alloy of copper and zinc. See Muntz's Metal.

Sheave, the wheel in a pulley block, over which the rope travels.

Sheboygan and Fond du Lac R. R. runs from Sheboygan to Princeton, Wis., 79 m. This Co., located at Fond du Lac, Wis., was formed in 1861, and the road was completed in 1872. Cap. stock, \$1,410,500; funded debt, \$1,600,000. Cost of construction and equipment, \$2,871,770.

Sheep [Fr. *mouton;* Ger. *Schaf;* It. *pecora;* Sp. *pecora, oveja*], a ruminating animal of the genus *ovis*, chiefly distinguished for its fur or hair, which is of two kinds,—one hard and close, and the other woolly; the latter preponderating in proportion as the animal is domesticated. In this country and other parts of the world the sheep is carefully tended for its wool, which is the chief material of the clothing of all northern nations. But every part is fitted for use. The flesh, heart, liver, kidneys, and spleen, as food; the intestines are made into strings for musical instruments; the skin into leather and parchment; the bones into handles, spoons, and toys; the internal and loose fat makes tallow; their milk may be made into cheese; and their dung is a rich manure. The sheep, besides, can be reared in situations unfitted for any other quadruped. After 5 months' gestation the lamb is dropped, usually in March or April; and May and June are the *sheep-shearing* months, as the animal sheds the superfluous wool on the approach of warm weather. It lives naturally for about 15 years; but from $1\frac{1}{2}$ to 2 years is the common period at which it is fattened for food; and even

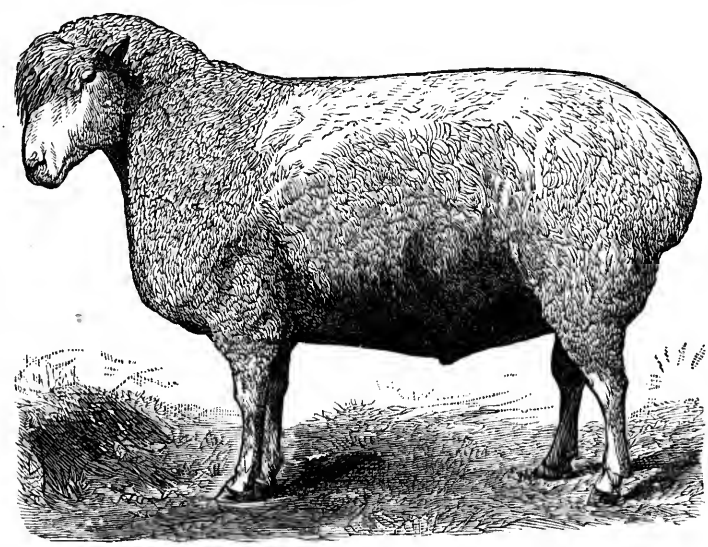

Fig. 444. — Cotswold Ram.

breeding stock are not usually kept beyond five or six years. Age is reckoned, not from birth, but from the first shearing. The male is called a *ram* or *tup;* after weaning he is said to be a *hog* or *hogget*, a *lamb-hog* or *tup-hog;* and if castrated, a *wether-hog*. After shearing, when fully one year old, he is a *shear-hog* or *shearling*, a *dinmont*, a *tup*, or *shearing-wether;* and after the second shearing a *two-shear ram* or *tup*. The female is a *ewe* or *gimmer lamb* until weaned; then a *gimmer* or *ewe hog;* after being shorn a *shearing ewe* or *gimmer;* after that a *two-shear ewe;* and so on.

"America has no indigenous domestic sheep. The first sheep were introduced into the U. States at Jamestown, Va., from England in 1609, which in 40 years had increased to 3,000; they were introduced into New York and Massachusetts about 1625. Both Spanish and French merinos have been introduced; the former by David Humphreys, Minister to the Court Madrid, in 1802, and the latter by Mr. Taintor, of Hartford, Conn., in 1846. They are hardy, yielding a large amount of fine wool for their size, the males 10 to 16 lbs. of washed wool, and the females 4 to 8, the former weighing from 140 to 175 lbs., the latter from 80 to 130. They thrive in summer on grass and clover, and in winter on hay, wheat bran, barley, oats, and root crops; in winter they require sheds for protection, free space, pure air, and water accessible. The best breeds are generally considered to be the Vermont Brewer and Atwood flocks; some regard the Saxon merinos as the best, and the French have less oil in their wool than the Spanish. The Leicester breed has a heavier fleece and carcass, but requires more food; as combining the advantages of wool and meat, this is the best breed for the farmer, and is excellently bred in New Jersey; the wool is long staple, and is used mostly for combing purposes, for delaines and similar cloths. The Southdowns are by many preferred to the merinos, as a third larger, hardier, and better mutton; they are very prolific, and the lambs are hardy; the wool is large in quantity and fair in quality. The Cotswold (Fig. 444) also is highly esteemed. As a general rule, the fine-woolled sheep, like the merino, Saxon, French, and Silesian, are not so profitable for the mutton as the coarse-woolled, like the Leicester, Southdown, and Cotswold; it seems impossible to combine in a single breed both these qualities in their greatest perfection. The northern and western States raise the best sheep for mutton, and the middle and southern for wool." — *The American Cyclopædia.* The number of sheep in the U. States, as reported by the census of 1870, was 28,477,951. According to the report of the bureau of agriculture, the number, average price, and total value of sheep in each State, in January, 1880, was as follows :—

States.	Number.	Average price.	Value.
Maine	525,800	$2 78	$1,461,724
New Hampshire	239,900	2 60	623,740
Vermont	461,400	2 82	1,301,148
Massachusetts	60,300	3 60	217,080
Rhode Island	24,500	3 75	91,875
Connecticut	92,500	3 70	342,250
New York	1,518,100	3 30	5,009,730
New Jersey	128,300	4 46	572,218
Pennsylvania	1,607,600	3 09	4,967,484
Delaware	35,000	4 00	140,000
Maryland	151,200	3 65	551,880
Virginia	422,000	2 58	1,088,760
North Carolina	490,000	1 54	754,600
South Carolina	175,000	1 80	315,000
Georgia	382,300	1 57	600,211
Florida	56,500	1 90	107,350
Alabama	270,000	1 75	472,500
Mississippi	250,000	1 75	437,500
Louisiana	125,000	1 80	225,000
Texas	3,674,700	2 09	7,680,123
Arkansas	285,000	1 85	527,250
Tennessee	850,000	1 92	1,632,000
West Virginia	549,900	2 17	1,193,283
Kentucky	900,000	2 97	2,673,000
Ohio	3,783,000	2 78	10,516,740
Michigan	1,750,000	2 53	4,427,500
Indiana	1,092,700	2 14	2,338,378
Illinois	1,258,500	2 48	3,121,080
Wisconsin	1,323,700	2 44	3,229,828
Minnesota	300,000	2 20	660,000
Iowa	560,000	2 30	1,288,000
Missouri	1,271,000	1 82	2,313,220
Kansas	156,600	2 31	361,746
Nebraska	62,400	2 77	172,848
California	6,561,000	1 52	9,972,720
Oregon	1,074,600	1 76	1,891,296
Nevada	72,000	2 00	144,000
Colorado	600,000	2 00	1,200,000
The Territories	2,600,000	2 30	5,980,000
Total	35,740,500	....	80,603,062
Average of prices	....	2 25	....

The number of sheep exported in the year 1879 was 215,680, valued at $1,082,928; of which 98,177, valued at $824,226, went to England, and 89,689, valued at $103,789, to Mexico.

Imp. duty: living sheep, 20 per cent; skins, with wool on, finished, fit, and intended for immediate use as rugs, 45 per cent; raw or unmanufactured skins, with the wool on, 30 per cent; skins with wool on, dressed, but for other uses than as mats or rugs, 20 per cent; skins "pulled," that is, of the hair which grows beyond the fur (as undressed furs), free.

Sheep-Hook, a shepherd's crook for catching sheep by the legs.

Sheep-Shears, a steel clipping-instrument used in shearing sheep.

Sheep-Splits, the pelts or skins of sheep, split by the cutting knife or machine into two sections.

Sheers, a triangular erection of spars for hoisting out masts or fitting them in.

Sheet, something extended or spread out, as a covering; anything expanded; — specifically, a broad and large piece of linen or cotton cloth spread over a bed; used as a part of bed-furniture next to the body. — A broad piece of paper as it comes from the manufacturers, or folded into pages. — A broad surface or expanse of liquid, etc.; as, a *sheet* of water. — A broad, thinly spread-out portion of metal or other substance; as, a *sheet* of copper, a *sheet* of glass, etc. — The rope attached to the after or leeward clew or corner of a sale, to extend it to the wind. In the square sails above the courses, the ropes attached to both clews are called *sheets;* in all other cases the weathermost one is termed a *tack.* — *Sheet* is frequently employed in composition to indicate that the substance to the name of which it serves as a prefix is in the form of sheets, thin leaves, or laminæ; as, *sheet*-iron, *sheet*-lead, etc.

Sheet-Anchor. See ANCHOR.

Sheet-Cable, the strongest and best cable of a ship; that attached to the sheet-anchor.

Sheet-Glass. See GLASS.

Sheeting, linen or cotton cloth for bed sheets.

Sheet Iron, a name given in common to iron formed into sheets, or very thin plates, of a variety of sorts. Sheet irons are generally produced by passing bars or slabs between polished rollers, under pressure, and with reheating as may be necessary, until brought to the thinness required. The usual size of the sheets is from 22 to 72 in. sq.; tagger iron, a variety, 8 to 12 in. and 12 to 20 in., and of different thicknesses. For the best sheet iron, gray pig of the first quality and free from sulphur is requisite. The Russian is the finest description of sheet iron produced, and that which best resists oxidation and the action of the atmosphere. It has a smooth, black, and glossy surface, and is very tenacious. *Belgian sheets* are a peculiarly made sort, with a fine, smooth, bluish-black surface, apparently due to a firmly adhering coat of oxide, and which must have been produced before the final rolling. *Canada plates* are Welsh or other sheet irons, cut like tin plates to small sizes, and boxed, for the making of stove-pipe. *T. McElrath.* — Extremely thin sheet iron, known as *iron-paper*, has been rolled thinner than the finest tissue-paper. The Upper-Forest Tin-works, of Swansea, Wales, has produced a sheet 10 x $5\frac{1}{2} = 55$ inches area, weighing but 20 grains, equal to 16 grains for an area of 44 inches, and having a thickness of $\frac{1}{1800}$ of an inch.

Sheet Lead. See LEAD.

Sheffield Ware, fine cutlery, and plated and other metal articles, of which Sheffield, England, is the chief seat of manufacture.

Shell, a hollow vessel of metal containing gunpowder, or other explosive compound, so arranged that it shall explode at a certain point, and spread destruction around by the forcible dispersion of its fragments. — A *bomb* is a spherical shell. — An en-

graved copper roller used in print-works. — The case of a block. — The hard envelope of eggs and of certain seeds and fruits. — The crustaceous or testaceous covering of certain animals, as the shell of a tortoise, an oyster, a lobster, etc. Shells are occasionally cut through to show their internal sections or structures; others are simply polished exteriorly in their entire state as specimens of natural history, or for their intrinsic beauty; and some few are cut up in the manufacture of various useful and ornamental works. Porcelaineous shells are generally univalve, or single shells, such as chanks, whelks, limpets, and cowries. Nacreous shells are much softer than the porcelaineous, and are for the most part bivalves, such as those of the various oysters, mussels, etc. A large trade is carried on in various kinds of shells either locally or generally. See CAMEO, MOTHER-OF-PEARL, TORTOISE-SHELL, etc.

Imp. duty: shells of every description, unmanufactured, including those only cleansed and polished with acids, free. Shells having undergone any process of manuf. by polishing and cutting, and all manuf. of shells, n. o. p. f., 35 per cent.

Shellac, SHELL LAC. See LAC.

Shell-Button, a hollow button made of two pieces of metal, one for the front and the other for the back: these are mostly covered with silk; a button formed of mother-of-pearl shell.

Shell-Comb, a lady's comb for the hair, or a toilet comb, made of tortoise-shell.

Shelled, separated from the husk or ear, as shelled Indian corn.

Shell-Fish, aquatic animals having a testaceous or crustaceous covering; the term is chiefly applied in commerce to crabs, lobsters, and cray-fish, oysters, mussels, periwinkles, and whelks, in which a large trade is carried on. *Imp.* free.

Shelling, a commercial name for groats, the grain of oats when the shudes are removed.

Shell-Work, flowers, baskets, and various ornamental articles made of shells.

Shepherd, a person who has the care and management of a flock of sheep.

Sherry. See SPANISH WINES.

Shid, wood cut into lengths of four feet for fuel.

Shield, a buckler or protection for the person. — An escutcheon.

Shields. See GREAT BRITAIN (SEAPORTS).

Shift, a miner's spell or turn of work (see COAL and Fig. 85). — A woman's linen or calico undergarment.

Shilling, the principal current British silver coin, the 20th part of a pound sterling, and worth 12*d*. or 24⅓ cents. The Canadian shilling passes only for 20 cents in the U. States.

Shim, a shallow plough for breaking up land and killing weeds. — A thin piece of metal placed between two parts to make a fit.

Shin, to run about borrowing money hastily and temporarily, as for the payment of one's notes at the bank.

Shingles, split or sawed oblong thin pieces of wood used for roofing purposes, classed with building materials. They are made chiefly of pine, though chestnut is often used, but those of cedar command a higher price. They are usually made from 16 to 30 inches long, and 4 to 6 or 8 inches broad, and at one end from ⅜ to ½ inch thick, and at the other end reduced to ⅛ of an inch. They are put up in packages of 1,000 each, and bound together by pieces of keyed timber.

Shingling, condensing bloom iron by a heavy hammer. See IRON.

Shingling-Hammer, a ponderous machine for hammering or shaping the blooms of iron into square or oblong pieces.

Shingling-Mill, a forge or large workshop where iron is made malleable.

Shin-Plaster, in the U. States, a colloquial vulgarism for irredeemable or depreciated bank-notes; more generally denoting a sum under one dollar.

Ship. Nautical men apply the term ship to distinguish a vessel having three masts, each consisting of a lower mast, a topmast, and top-gallant mast, with their appropriate rigging. In familiar language, it is usually employed to distinguish any large vessel, however rigged; but it is also frequently used as a general designation for all vessels navigated with sails; and it is in this sense that we now employ it. It is hardly possible to divide merchant ships into classes, at least with any degree of precision. Their size, shape, the mode of their rigging, etc., depend not merely on the particular trade for which they are destined, but on the varying tastes and fancies of their owners. In the articles BILL OF LADING, BARRATRY, BOTTOMRY, CHARTER-PARTY, DEMURRAGE, FREIGHT, MARINE INSURANCE, MASTER, RESPONDENTIA, SHIP-OWNER, SEAMEN, SEAWORTHY, etc., the law with respect to ships and ship-owners, in their capacity of carriers or public servants, and the reciprocal duties and obligations of the masters and crews, is pretty fully expounded.

Shipbuilding. — Timber ships are built in different forms, according to the service they are intended for, and the burdens they have to carry. It is in men-of-war, which, besides possessing in an eminent degree the general qualities of a ship, have to support a heavy armament of cannon, and which are destined to severe and long-continued service, that the principles of construction have been carried to the greatest perfection. The form of the ship, her strength, or the scantling necessary for the services required of her, are, from our imperfect knowledge of hydrodynamics, the results of experience alone. When a ship is to be built, her form is projected in three different planes perpendicular to each other. 1. The *sheer draught*, which is the side view, or projection on the plane of the keel. On this are laid off the length, the heights of all the parts from the keel, the position and rake of the stem and sternpost, the principal frames or timbers of the sides, the ports, decks, channels, place of the greatest breadth or midship frame, stations of the masts, etc. The frames before the midship frame are distinguished by letters; abaft it, by numbers. The midship frame is not exactly in the middle of the length, but rather before it. 2. The *body plan*, or end view. This shows the contour of the sides of the ship at certain points of her length, and since the two sides are exactly alike, the left half represents the vertical sections in the after part of the body, and the right-hand half those in the fore part. The base of the projection is the midship, or largest section, called also the *dead flat*, within which the other sections are delineated. On this are exhibited also the beams of the decks. 3. The horizontal or floor plane, called also the *half breadth plan*. The base of this is the section made by the horizontal surface of the water and the outside surface of the ship, and is called the *upper water-line* or *load water-line*. If the ship now be supposed to be lightened uniformly, she will exhibit another water-line, and thus any number of like parallel sections at equal distances down to the keel. On this projection the water-lines appear as curves, on the sheer draught as straight lines parallel to the keel. These three sections correspond to each other upon the same scale, and any point in one is immediately referable to the other two projections. The several parts are drawn from these plans in their full size on the floor of the mould-loft, and worked from the moulds or model so taken.

The place in which the ship is built is called a *slip*. In the middle, and leading to the water, is a row of piles of stout pieces of wood called the *blocks*, having a declivity towards the water of about one inch in one foot. On these the keel, which is of elm, is laid, and its component lengths scarfed together. Under the keel is placed the false keel for defence. At the end farthest from the water is raised the *stem*, which is, in fact, the keel continued upwards. Inside the stem, and just above the keel, is the *apron*, a curved timber connecting both. On each side of the upper part of the stem is fixed an upright timber; these are called the *knight heads*, and the bowsprit lies between them. At the other end of the keel is the sternpost, at which the planking finishes abaft, and on which the rudder is hung. Inside (or before this) are the *inner post* and other pieces for strength. Upon the keel is fixed a layer of timber of the same breadth, and rising forward and aft, called

the *dead-wood;* on this are placed the *floor timbers;* these consist of one which crosses the keel to which it is coaked, and the two parts of a like timber firmly joining it, and projecting beyond its ends. The several pieces are got into their places by shifting shears.

The *frames* consist of pairs of timbers composed of pieces of different lengths, joining the floor timbers, and carried upwards. The length joining the floors is called the first futtock, the next the second futtock, and so on, ending in the *top timbers.* The pairs are bolted by iron bolts, and of late adjacent pairs have been thus connected. The frames are supported temporarily by being fixed to the *cross spalls,* long fir planks laid horizontally about the height of the gun deck. Those frames whose planes are perpendicular to the keel are called *square frames;* at the head and stern these planes incline toward the extremities, and are called *cant frames.* These divisions of the ship are called, accordingly, *square* and *cant bodies.* When the framing has assumed its form, the *ribands* are fixed; these are thick, narrow planks at wide intervals, extending the length of the vessel, marking the direction of the planks; they are firmly shored, and removed when the planking comes on. The *riband lines* appear on the half breadth plan as diagonal lines. Upon the keel, and over the floor timbers, to which it is scored, is laid the *kelson,* which is, in fact, a second keel over the first. The stern of square-sterned ships is formed upon the *wing transom,* the uppermost of the horizontal pieces of timber, called *transoms,* crossing the sternpost inside. The wing transom is secured to the timbers of the side by a strong horizontal knee. When the framing is complete, the outside planking is laid on. The *wales,* thick planks above the water, are first secured to the ribs. The *clamps* are thick planks inside, to support the ends of the beams of the decks. The *beams* support the decks, rest on the clamps, and are secured to the side by *knees.* The *breast hooks* are strong curved pieces of timber crossing the stem, and joining the bows. The *deck hooks* are the same, being at the decks. The *crutches* answer a like purpose below in the after part. The *port sills* are the upper and lower edges of the ports. The *spirketting* is the plank of the side between the water-way and the port sill. The *chain wales* are thick planks of the outside to receive the chains and preventer-bolts for the support of the rigging. The *foot waling,* or *ceiling,* is the plank lining the inside of the ship below. The *limber boards* are short, thick pieces of wood resting against the kelson for the convenience of keeping a clear passage to the well. The *knee of the head,* also called the *cutwater,* is the projecting part of the head; it is secured to the bows by knees called *cheeks.* In order to bend wood into the necessary curvature, it is steamed in places for the purpose. When the planking is all complete, the ship is calked and painted, and then launched. See LAUNCH. The making of *port-holes, magazines, bunkers, cabins, berths, luggage-rooms, hold,* etc., is a kind of carpenter's work, which goes on by degrees during the building of the ship. The *masts* are made by a distinct set of men. There are three masts for a large ship, two for a schooner or a brig, and one for a sloop or a cutter; besides this, each mast is usually built up of two or more, called *lower, top,* and *top-gallant.* According to their position, beginning with the stern, the three masts are called *mizzen, main,* and *fore.* To aid towards the stability of the masts, and the attachment of sails and rigging to them, there are *yards, booms, tops, cross-trees, trestle-trees,* and timbers and spars of various kinds. A very large mast is built up of pieces called *spindles, side-trees, cheeks, fillings, cant pieces, front fishes,* and other odd names, bound together by iron wedges, driven in hot. Whatever names may be given to vessels, be they *ship, frigate, brig, corvette, schooner, brigantine, cutter, ketch,* etc., the building depends on the same general rules, modified in detail according to the size and shape of the vessel. To prevent the adhesion of shell-fish and sea-weed, whose accumulation materially reduces the speed, the bottoms of ships are now sheathed almost universally with thin sheets of copper, which by exfoliation sheds or sloughs off such adhesions. — *Iron Ships.* There is much more simplicity in the building of an iron ship than one of timber. The *rivet* is the great bond of union. Bar-iron, angle-iron, sheet-iron, plate-iron, brought into form by rolling, cutting, drilling, punching, slotting, and other processes, are connected together by thousands of rivets. Angle-iron represents the frame-timbers, and sheet or plate iron represents the planking. Some of the thicker masses in particular are of cast-iron, but, generally speaking, the iron is in the rolled state.

Ship-Biscuit, hard, coarse biscuit, specially prepared for use on shipboard.

Ship-Breaker, a person who buys the hulls of worn-out vessels, to break up for the timber and metal they contain.

Ship-Broker, a person who undertakes the management of all business matters occurring between the owners of vessels and the shippers or consignees of the goods which they carry; such as procuring cargo or a charter for outward-bound ships, entering and clearing them at the custom-house, and collecting freight on the goods which vessels bring into port. Many ship-brokers act also as insurance-brokers, in which capacity they procure underwriters to policies of insurance, adjusting with the latter the various conditions under which they engage to take the risk, and recovering the sums for which they are responsible in the event of loss.

Shipbuilder, a shipwright; one who constructs vessels.

Ship-Chandler, a dealer in small wares and stores required for a ship.

Ship-Load, as much as a vessel can stow.

Ship-Owner. The ownership or title to a ship can be acquired in several ways, as by purchase, building, or capture. In regard to the first, it is generally done by a bill of sale, of which there are two kinds: the first is where the ship passes from the builder to the first purchaser, and is called the grand bill of sale; the second is where the owner of the ship, not being the builder, transfers his interest to another purchaser. Upon the death of the owner, his interests devolve upon his executors or his personal representatives. Special conditions may be introduced which may vest the property in the purchaser, although the property may not have been completed, such as a payment of a certain part of the purchase-money, when a part of the vessel has been completed; and he may insist upon the completion of that vessel, and the builder can not require him to accept any other. A ship's boat does not constitute a part of a vessel's tackle, apparel, furniture, etc. Property in ships is sometimes acquired by capture. During war, ships and private ships having letters of marque, are entitled to make prizes. But before the captors acquire a legal title to such prizes, it is necessary that they should be condemned in the admiralty or other court constituted for that purpose. When this is done, the captors are considered to be in the same situation, with respect to them, as if they had built or purchased them. See PRIVATEER, LETTER OF MARQUE, PRIZE, and SHIP and SHIPPING.

Shippage, a port due which is charged in some harbors.

Shipped, transmitted by sea; goods consigned or forwarded to order.

Shipper, an exporter of goods; the person who enters at the customs, in his name, goods sent by a ship.

Shipping, ships in general; ships or vessels of any kind fitted for navigation; collective tonnage.

The most important branches of the Law of Shipping will be found discussed under BARRATRY, BILL OF LADING, BOTTOMRY, CHARTER-PARTY, DEMURRAGE, FREIGHT MASTER, MARINE INSURANCE, REGISTRY, RESPONDENTIA, SEAMEN, SMUGGLING, etc. Almost the only subject that remains for special consideration is the responsibility of ship-owners for goods committed to their charge, independently of special contract. It is the duty of the owners to have their vessel, both in hull and rigging, suited for the voyage, and for the safe-keeping of the species of cargo contracted for or received on board. There must be a competent master and a sufficient crew of able seamen. The ship must have on board whatever papers are necessary for her protection and that of her cargo, whether required by the laws of the country she belongs to, or by those of the port of destination, or dictated by international law. There must be no false or fraudulent papers, which may subject the ship to capture or detention. The mercantile customs of the port must be adhered to in regard to the employment of wharfingers, lightermen, etc., in lading. The owners are responsible for theft or robbery committed before breaking ground. The master, previous to sailing, must make the necessary clearances at the custom-house, and pay all the usual charges. When the preliminaries are completed, the master must sail without delay when the weather is favorable, but not till then. Where sailing with convoy is stipulated for or required by law, the sanction must be obeyed in terms of the law on that subject. A pilot must be employed in those roads, rivers, and narrow seas where such a precaution is enjoined, either by special law

or usage. The master must proceed to the place of destination without delay and without stopping at any intermediate port, or deviating from the straight and shortest course, unless such stopping or deviation be necessary to repair the ship from the effects of accident or tempest, or to avoid enemies or pirates, by whom he has good reason to suspect that he shall be attacked, if he proceeds in the ordinary track, and whom he has good reason to hope that he may escape by delay or deviation, or unless the ship sail to the places resorted to in long voyages for a supply of water and provisions, by common and established usage. If the ship be captured or lost in consequence of deviation, the freighter may recover the prime cost of his goods and the shipping charges. In cases of difficulty and of danger, the master has to keep in view that it is his primary duty to convey the cargo to its place of destination, and that it is only in an extreme case, and when there is scarcely a possibility of accomplishing this object, that he is entitled to act as agent for the freighter, and adopt the course that seems to involve the least sacrifice to his property. On arrival at the port of destination, the ship must be securely moored or anchored, and all papers delivered, and other requisites performed, in terms of the customs regulations and the laws of the place.

The following tables present an interesting synopsis of the history of the navigation of the U. States.

1.— *Table of Registered, Enrolled, and Licensed Sail and Steam Tonnage constituting the total Merchant Marine of the U. States, from* 1789 *to* 1879 : —

Year.	Total Merchant Marine.			Annual increase or decrease (—) per cent.
	Sail.	Steam.	Total.	
	Tons.	Tons.	Tons.	
1789	201,562	....	201,562	....
1790	478,377	....	478,377	137.33
1791	502,146	....	502,146	4.96
1792	564,457	....	564,457	12.40
1793	520,764	....	520,764	—7.74
1794	628,618	....	628,618	20.71
1795	747,965	....	747,965	19.00
1796	831,900	....	831,900	11.22
1797	876,912	....	876,912	5.41
1798	898,328	....	898,328	2.44
1799	939,408	....	939,408	4.57
1800	972,492	....	972,492	3.52
1801	947,576	....	947,576	—2.56
1802	892,106	....	892,106	—5.85
1803	949,172	....	949,172	6.39
1804	1,042,404	....	1,042,404	1.00
1805	1,140,367	....	1,140,367	9.40
1806	1,208,737	....	1,208,737	5.99
1807	1,268,548	....	1,268,548	4.95
1808	1,242,595	....	1,242,595	—2.04
1809	1,350,282	....	1,350,282	8.66
1810	1,424,783	....	1,424,783	5.51
1811	1,232,502	....	1,232,502	—13.49
1812	1,269,997	....	1,269,997	2.95
1813	1,166,628	....	1,166,628	—8.14
1814	1,159,209	....	1,159,209	—0.63
1815	1,368,128	....	1,368,128	18.02
1816	1,372,219	....	1,372,219	0.29
1817	1,399,912	....	1,399,912	2.02
1818	1,225,185	....	1,225,185	—12.48
1819	1,260,752	....	1,260,752	2.90
1820	1,280,167	....	1,280,167	1.54
1821	1,298,958	....	1,298,958	1.47
1822	1,324,699	....	1,324,699	1.98
1823	1,311,687	24,879	1,336,566	0.89
1824	1,367,553	21,610	1,389,163	3.94
1825	1,400,050	23,061	1,423,111	2.44
1826	1,500,132	34,059	1,534,191	7.80
1827	1,580,409	40,198	1,620,607	5.63
1828	1,701,974	39,418	1,741,392	7.45
1829	1,206,761	54,037	1,260,798	—27.60
1830	1,127,304	64,472	1,191,776	—5.47
1831	1,198,401	69,445	1,267,846	6.38
1832	1,348,636	90,814	1,439,450	13.53
1833	1,504,300	101,851	1,606,151	11.59
1834	1,636,093	122,814	1,758,907	9.51
1835	1,702,127	122,814	1,824,941	3.75
1836	1,736,546	145,556	1,882,102	3.13
1837	1,741,921	154,765	1,896,686	0.77
1838	1,802,217	193,423	1,995,640	5.22
1839	1,901,451	195,028	2,096,479	5.05
1840	1,978,425	202,339	2,180,764	4.02
1841	1,955,656	175,088	2,130,744	—2.30
1842	1,862,640	229,751	2,092,391	—1.80
1843	1,921,736	236,867	2,158,603	3.16
1844	2,007,916	272,180	2,280,096	5.63
1845	2,090,983	326,019	2,417,002	6.00
1846	2,214,192	347,893	2,562,085	6.00
1847	2,434,205	404,841	2,839,046	10.81
1848	2,726,151	427,891	3,154,042	11.09
1849	2,871,621	462,395	3,334,016	5.71
1850	3,009,507	525,947	3,535,454	6.04
1851	3,188,832	583,607	3,772,439	6.70
1852	3,495,200	643,240	4,138,440	9.70
1853	3,802,392	604,618	4,407,010	6.49
1854	4,126,295	676,607	4,802,902	8.96
1855	4,441,716	770,285	5,212,001	8.52
1856	4,198,576	673,077	4,871,653	—6.53
1857	4,235,059	705,784	4,940,843	1.42
1858	4,320,418	729,390	5,049,808	2.20
1859	4,376,285	768,753	5,145,038	1.90
1860	4,485,931	867,937	5,353,868	4.06
1861	4,662,609	877,204	5,539,813	3.47
1862	4,401,701	710,463	5,112,164	7.72
1863	4,579,537	575,519	5,155,056	0.84
1864	4,008,440	977,960	4,986,400	—3.27
1865	4,029,643	1,067,139	5,096,782	2.21
1866	3,227,266	1,083,512	4,310,778	—15.42
1867	3,112,607	1,191,880	4,304,487	—0.14
1868	3,152,344	1,199,415	4,351,759	1.10
1869	3,041,073	1,103,568	4,144,641	—4.76
1870	3,171,412	1,075,095	4,246,507	2.46
1871	3,194,970	1,087,637	4,282,607	0.85
1872	3,326,194	1,111,553	4,437,747	3.62
1873	3,539,584	1,156,443	4,696,027	5.82
1874	3,615,042	1,185,610	4,800,652	2.23
1875	3,685,064	1,168,668	4,853,732	1.10
1876	3,107,086	1,172,372	4,279,458	—11.83
1877	3,071,403	1,171,197	4,242,600	—0.86
1878	3,045,087	1,167,678	4,212,765	—0.70
1879	2,993,429	1,176,172	4,169,601	—1.02

2.— *Tonnage of vessels built in the U. States from* 1817 *to* 1879 : —

Year.	Tonnage Built.				Total Built.
	In the New England States.	On the entire Seaboard.	On the Mississippi River and its Tributaries.	On the Great Lakes.	
	Tons.	Tons.	Tons.	Tons.	Tons.
1817	46,605	85,144	....	1,250	86,393
1818	48,823	82,232	....	189	82,421
1819	50,614	79,551	....	267	79,818
1820	29,353	47,696	....	88	47,784
1821	36,651	55,607	....	249	55,856
1822	44,206	75,242	....	105	75,347
1823	42,725	73,942	663	403	75,008
1824	52,445	89,166	1,262	511	90,939
1825	65,616	112,616	1,754	627	114,997
1826	72,668	121,908	2,486	2,044	126,438
1827	57,156	99,343	3,761	1,239	104,343
1828	54,282	95,349	2,454	573	98,376
1829	38,117	71,055	5,315	729	77,099
1830	24,169	52,086	4,517	881	58,084
1831	49,793	80,541	4,410	812	85,763
1832	100,585	130,064	12,332	2,143	144,539
1833	95,143	153,455	5,086	2,485	161,626
1834	61,779	105,683	8,174	4,473	118,330
1835	(†)	(†)	(†)	(†)	46,238
1836	58,330	98,130	12,465	3,032	113,627
1837	51,981	98,997	19,041	4,949	122,987
1838	53,054	100,074	9,174	3,887	113,135
1839	59,204	107,232	10,264	3,493	120,989
1840	65,189	169,706	6,817	1,786	118,309
1841	63,770	103,576	12,200	3,118	118,894
1842	56,234	108,302	16,520	4,260	129,084
1843	26,512	56,132	6,104	1,382	63,618
1844	36,268	71,732	25,296	6,509	103,537
1845	63,835	116,156	20,908	9,634	140,018
1846	82,347	149,332	25,560	13,312	188,204
1847	104,682	185,493	30,339	27,901	243,733
1848	146,111	262,581	31,066	24,429	318,076
1849	120,234	217,261	19,899	19,414	256,577
1850	142,367	247,847	16,594	7,778	272,219
1851	133,349	264,379	25,958	7,867	298,204
1852	179,801	300,677	39,575	11,241	351,493
1853	222,789	356,733	37,331	31,508	425,572
1854	289,598	455,136	37,194	43,306	535,616
1855	326,429	505,052	32,971	45,427	583,450
1856	252,971	368,681	36,785	63,928	469,394
1857	183,625	285,453	41,854	51,498	378,805

Table 2. — Continued.

Year.	Tonnage Built.				
	In the New England States.	On the entire Seaboard.	On the Mississippi River and its Tributaries.	On the Great Lakes.	Total Built.
		Tons.	Tons.	Tons.	Tons.
1858......	103,862	177,353	33,292	31,642	242,287
1859......	79,322	133,294	17,128	6,180	156,602
1860.	134,289	169,836	31,064	11,992	212,892
1861......	104,675	179,767	29,960	23,467	233,194
1862......	45,595	112,487	8,785	53,804	175,076
1863......	79,576	215,505	27,407	67,972	310,884
1864......	112,611	310,421	56,169	49,151	415,741
1865......	132,885	280,511	66,576	36,719	383,806
1866......	121,333	232,388	70,555	33,204	336,147
1867......	135,189	230,810	35,106	37,613	303,529
1868......	98,708	175,812	52,695	56,798	285,305
1869......	103,604	191,194	34,576	49,460	275,230
1870......	110,584	182,836	56,859	37,258	276,953
1871......	64,366	156,249	73,080	43,897	273,226
1872......	46,269	128,097	36,344	44,611	209,052
1873......	76,406	218,139	48,659	92,448	359,246
1874......	136,251	277,093	63,646	91,986	432,725
1875......	151,497	244,474	23,294	29,871	297,639
1876......	95,288	163,826	23,636	16,124	203,586
1877......	90,992	132,996	34,693	8,903	176,592
1878......	90,386	155,138	68,928	11,438	235,504
1879......	55,874	115,683	62,213	15,135	193,031

3. — *Tonnage of Vessels of the U. States employed in the Foreign and Coastwise Trades, and in the Fisheries, from* 1859 *to* 1879 : —

Year.	Foreign trade.	Coastwise trade.	Whale Fisheries.	Cod and Mackerel Fisheries.
	Tons.	Tons.	Tons.	Tons.
1859..........	2,321,674	2,480,929	185,728	156,707
1860..........	2,379,396	2,644,867	166,841	162,764
1861..........	2,496,894	2,704,544	145,734	192,641
1862..........	2,173,537	2,606,716	117,714	214,197
1863..........	1,926,886	2,960,633	99,228	168,309
1864..........	1,486,749	3,245,265	95,145	159,241
1865..........	1,009,151	2,365,323	89,136	53,178
1866..........	1,031,541	2,162,220	76,990	97,728
1867..........	1,300,852	2,528,214	52,384	76,065
1868..........	1,460,940	2,702,140	71,343	83,887
1869..........	1,496,220	2.515,515	70,202	62,704
1870..........	1,448,846	2,638,247	67,954	91,460
1871....... ..	1,363,652	2,764,600	61,490	92,865
1872..........	1,359,040	2,929,552	51,608	97,547
1873..........	1,378,533	3,163,220	44,755	109,519
1874..........	1,389,815	3,293,439	39,108	78,290
1875..........	1,515,598	3,219,698	38,229	80,207
1876..........	1,553,705	2,598,835	39,116	87,802
1877..........	1,570,600	2,540,322	40,593	91,085
1878..........	1,589,348	2,497,170	39,700	86,547
1879..........	1,451,505	2,598,183	40,028	79,885

4. — *Value of the Imports and Exports of the U. States carried, respectively, in U. States Vessels and in Foreign Vessels, from* 1839 *to* 1878 (*including Merchandise and Coin and Bullion*), *with the percentage carried in Vessels of the U. States*: —

Year.	Total imports and exports carried in American vessels.	Total imports and exports carried in foreign vessels.	Percentage carried in American vessels.
1839........	$238,662,200	$44,458,348	84.3
1840........	198,424,609	40,802,856	82.9
1841........	208,030,515	41,767,465	83.3
1842........	168,617,303	36,236,318	82.3
1843........	115,025,511	34,074,768	77.1
1844........	172,625,202	47,009,879	78.6
1845........	189,380,923	42,520,247	81.7
1846........	192,558,348	42,621,965	81.7
1847........	213,346,161	87,272,491	70.9
1848........	238,305,163	70,725,896	77.4
1849........	220,915,275	72,697,984	75.2
1850........	239,272,084	90,764,954	72.5
1851........	316,107,232	118,505,711	72.7
1852........	294,735,404	123,219,817	70.5
1853........	346,717,127	152,237,677	69.5
1854........	406,698,539	170,591,875	70.5
1855........	405,485,462	131,139,904	75.6

Table 4. — Continued.

Year.	Total imports and exports carried in American vessels.	Total imports and exports carried in foreign vessels.	Percentage carried in American vessels.
1856........	$482,268,274	$159,336,576	75.2
1857........	510,331,027	213,519,796	70.5
1858........	447,191,304	160,066,267	73.7
1859........	465,741,381	229,816,211	66.9
1860........	507,247,757	255,040,793	66.5
1861........	381,516,788	203,478,278	65.2
1862........	217,695,418	218,015,296	50.0
1863........	241,872,471	343,056,031	41.4
1864........	184,061,486	485,793,548	27.5
1865........	167,402,872	437,010,124	27.7
1866........	325,711,861	685,226,691	32.2
1867........	296,998,387	580,022,004	33.9
1868........	297,981,573	550,546,074	35.1
1869........	289,956,772	586,492,012	33.1
1870........	352,969,401	638,927,488	35.6
1871........	353,664,172	755,822,576	31.8
1872........	345,331,101	839,346,362	29.1
1873........	346,306,592	966,722,651	26.4
1874........	350,451,994	939,206,106	27.2
1875........	314,257,792	884,788,517	26.2
1876........	311,076,171	813,354,987	27.7
1877........	316,660,281	859,920,536	26.9
1878........	313,050,906	876,991,129	26.3

5. — *Tonnage of American and Foreign Sailing and Steam Vessels entered at Seaports of the U. States from Foreign Countries from* 1864 *to* 1879 : —

Year.	American.	Foreign.	Total.
	Tons.	Tons.	Tons.
1864............	1,655,434	2,512,047	4,167,481
1865............	1,615.317	2,211,610	3,826,927
1866............	1,891,453	3,117,034	5,008,487
1867............	2,145,691	3,120,695	5,266,386
1868............	2,465,695	3,105,826	5,571,521
1869............	2,459,336	3,572,644	6,031,980
1870............	2,452,226	3,817,963	6.270,189
1871............	2,603,591	4,390,606	6,994,197
1872............	2.584,646	5,185,340	7,769,986
1873............	2,443,285	5,951,464	8.394,749
1874............	2,914,942	7,094,713	10,009,655
1875............	2,887,153	6,255,985	9,143,138
1876............	2,927,780	6,788,124	9,715,904
1877............	2,957,791	7,448,697	10,406,488
1878............	3,009,437	8,521,090	11,530,527
1879............	3,049,744	10,718,394	13,768,138

The preceding tables exhibit a decline and long-continued depression of the shipbuilding and shipping interests of this country which appear, at first sight, strange and anomalous. There is found in the U. States an abundance of all the materials for building both wooden and iron vessels, and our shipbuilders possess the requisite talents and enterprise for utilizing such materials. In seamanship and the conduct of maritime affairs, American citizens were, for more than sixty years, distinguished among the nations of the globe. The population, the wealth, and the internal commerce of the country have constantly increased, and our industries have exhibited from decade to decade a steady advancement. But the decline of that branch of the American merchant marine which is engaged in foreign commerce is due in a great measure to the following circumstances: Probably no other branch of American industry comes so directly into competition with foreign industries as do those of building vessels and operating them in international commerce. Under our relations of maritime reciprocity the vessels of nearly every foreign nation enter American ports from foreign countries upon an equality with American vessels. Neither tariff legislation, nor navigation laws, nor transportation charges, nor any other natural or accidental circumstance intervenes to repress or shut out foreign competition. Evidently, under such conditions, the nation which can build and operate vessels the cheapest must eventually secure the principal share of the carrying trade in our foreign commerce. This result has taken place, and the fact is clearly recorded in the statistics hereinbefore presented. So long as wooden sailing vessels were the only vehicles of commerce upon the ocean, American tonnage rapidly increased. This was mainly due to the abundance and cheapness of shipbuilding materials in this country. The U. States had, about the year 1850, nearly attained to the first rank among the maritime nations of the globe. The genius and the talents of American naval architects and shipbuilders were stimulated to their best efforts, and our clipper ships became renowned in all parts of the world for their superiority, both in point of

speed and seaworthiness. But the introduction of iron as a shipbuilding material, and the rapid substitution of steam-vessels for sailing vessels, produced a very marked change, throwing the advantage in the cost of shipbuilding very largely upon the side of Great Britain. The change from wooden to iron vessels began to take place about the year 1857. The destruction and transfer to other nationalities of American vessels, during the late civil war, also had a very depressing effect upon our maritime interests; and the inflation of prices in this country, resulting from the depreciation of the national currency, greatly added to the difficulty of competing in iron-ship building. Under these circumstances, the British merchant marine gained an unprecedented ascendency in international commerce. During the year 1856 the tonnage of British vessels entered at seaports of the U. States from foreign countries, was less than one third the tonnage of American vessels entered; but during the year 1879 the tonnage of American vessels entered was less than three fifths of the tonnage of British vessels entered. The increase of British tonnage and the decline of American tonnage are also to some extent due to the fact that Great Britain has, from the beginning, pursued the policy of aiding steamship lines by liberal compensation for the transportation of the mails, such compensation being generally in the nature of subsidies, until the increase of trade has rendered them self-sustaining. Such aids have, however, been much less effective in fostering the maritime interests of Great Britain than have the advantages possessed by that country in the cost of building and operating vessels. — While it is impossible, with any degree of confidence, to predict the future of that branch of our merchant marine engaged in commerce with foreign nations, there are indications that American shipbuilders and ship-owners may, in the course of a few years, be able once more to enter the lists with their foreign competitors. The difference between the cost of building iron vessels in this country and in Great Britain is much less at the present time than it was ten years ago. This is due chiefly to the reduction in the wages of labor and of the prices of materials in the U. States. The fact that it has recently become possible for many products of American manufacture to be sold in foreign markets in competition with the products of long-established industries of other manufacturing countries, inspires the hope that the intelligent and persistent efforts which have been made by American shipbuilders, in the construction of iron vessels, chiefly for our home trade, will ultimately enable them to compete with foreign shipbuilders in supplying vessels for our trade with foreign countries. — At the present time, 59 per cent of the tonnage of the country is employed in the coastwise trade. This branch of our merchant marine preserves the art of shipbuilding among us, and sustains a large force of seamen, upon which the country may rely for the recruitment of its naval service in time of war.

Shipping Articles, an agreement which is binding between the captain of a vessel and the seamen he engages, specifying the amount of wages, length of time for which they are shipped, and which has to be signed by the sailors before they go on board the vessel.

Shipping-Bill, an invoice or manifest of goods placed on board a ship.

Shipping Interest, the owners of ships, and parties generally interested by business with shipping.

Ship-Rigged, square-rigged, as a three-masted ship is with large, square sails, and spreading yards.

Ship's-Husband, a part owner, or other person appointed as a manager to look after and provide stores, provisions, or assistance for a ship when in port.

Ship's-Papers, the certificate of registry, charter-party, manifest, and other official documents, required to be produced on certain occasions.

Ship's-Smith, an iron worker who fits the metal work, bolts, etc., in ships.

Ship's-Stores, a term most generally restricted to salted or preserved provisions, spirits, groceries, flour and meal, ship-biscuit, etc., which are taken on board a vessel for the use of its officers, passengers, and seamen.

Ship's-Thimbles, concave iron rings or eyes, used in the sails and rigging of vessels, to prevent the chafing of ropes when attached to hooks, bolts, staples, etc.

Shipwreck, the loss of a vessel at sea, or the stranding of a vessel.

Shipwright, a shipbuilder; a carpenter who works on ships.

Ship-Yard, a marine building-yard; the works of a shipbuilder.

Shiraz, a Persian wine, which, for exportation, is put into flasks of glass called *carabas*, of about 30 qts., covered with plaited straw, and packed in chests of 10 bottles each. The red wine is like claret in appearance, and of a taste not agreeable to strangers. The white resembles Madeira, to which it is by no means equal.

Shirr, an insertion of elastic cord between two pieces of cloth.

Shirt, a man's under-garment of linen, cotton, or flannel.

Shirtings, yard-wide linen or cotton fabrics, adapted to and more especially used for making into shirts.

Shoal, a place where the water of a river, lake, or sea is shallow or of little depth. — A throng, as a *shoal of herrings*.

Shoddy, worsted yarn from old stockings, flannels, and soft materials, torn up, fibre by fibre, in a "devil" (as it is technically termed), and respun into yarn, with the addition of a little fresh wool. Shoddy is made into an inferior cloth, into druggets, padding, and other articles.

Shoe, a covering for the feet, chiefly made of leather. See BOOT. — An iron protection for a horse's foot. — A miner's name for a trough, in a crushing-mill. — The sled or drag for a wheel.

Shoe and Leather Insurance Co., a fire and fire-marine insurance Co., located in Boston, Mass., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $300,000; net surplus, $220,-731; risks in force, $21,755,503; premiums, $283,-021. Premiums received since the organization of the Co., $1,681,723; losses paid, $714,452; cash dividends paid to stockholders, $180,000.

Shoemaker, a workman who makes shoes. — A tradesman who sells shoes and boots.

Shoe-Thread, a strong linen thread yarn, made for the special use of shoemakers. This thread is spun with what spinners call a very long reach, fully 22 inches, and without going through water. The only damp imparted to it is from a roller it passes over, which is kept moist with cold water. This thread yarn receives no twisting by machinery; the shoemakers do this for themselves by hand. *T. McElrath.*

Shooks, the staves and board headings for sugar and molasses boxes and hogsheads, ready to be put up together, the boards being secured in a compact form, each set separately, for transportation. Wine casks are also put up as shooks and headings for convenience of shipping. They form a staple article of exportation from the U. States, chiefly to the West Indies and Spain. The value of exports for the year 1879 was $3,770,440.

Shooting-Stick, a tapering piece of wood, generally of box or hawthorn, about 9 inches long, used by letter-press printers: it is applied to the quoins and struck heavily with a mallet, till the types are firmly fastened in an iron frame called a chase.

Shop, in England, a place where anything is sold by retail; a store. In this country the word is generally applied to places where articles are manufactured and kept for inspection or sale.

Shopkeeper, a retail dealer or store-keeper.

Shopman, an assistant who serves or attends in a shop.

Short, to be deficient in ready cash. — On the stock-exchange, etc., the term to *sell short* signifies the making a sale without stock in hand, relying

upon buying in the market early enough to make good the transaction.

Short Cash is when, payments being deducted, the cash on hand is less than the amount shown on the cash-book.

Short Crop, a crop which is under the average annual yield.

Short Ends. See FLUSHINGS.

Shorthand-Writer, a reporter who takes notes quickly and accurately in stenography or shorthand; an official engaged to take notes at a public meeting, trial, etc.

Shortheads, a sailor's term for sucking whales under one year old, which are very fat, and yield above 30 barrels of blubber.

Shorthorn Cattle. See CATTLE (NEAT).

Shorts, coarse flour; bran. See SHARPS.

Short-Shipped, a deficient quantity; goods shut out from a ship, accidentally or for want of room, although passed and cleared at the customs.

Shot. See LEAD.

Shot Belt, a leather sling pouch carried by sportsmen, to hold shot.

Shot Tower, an elevated tower from which shot is dropped into water.

Shoulders, a name in the leather trade for tanned or curried hides and kips; in the provision trade for a part of the foreleg of the hog.

Shovel, a wooden or iron scoop with a long handle; a kind of spade.

Show, an exhibition on a large or small scale.

Show-Case, a glass case in which fine goods are displayed in retail stores.

Showman, one who keeps a small exhibition.

Show-Room, a room for the display of goods or samples.

Shrapnell, a kind of bombshell filled with bullets, named after the inventor.

Shrimp, a small, long-tailed crustacean, the *Crangon vulgaris*, which in England and France is much used as food. Shrimps are boiled before being carried to market; they are in season during the whole year, though the chief demand is in spring. In the U. States they are chiefly used as bait. *Imp.* free.

Shrinkage, generally, a contraction of the bulk or volume of measurement of a body. Specifically, it signifies an allowance made of 1½ per cent for waste in the handling and admeasurement of grain while being exported. It is calculated upon the quantity entered upon the bill of export.

Shroud, grave-clothes for a corpse.

Shrouds, sets of ropes reaching from the lower mast-heads to the vessel's sides, to steady and secure the masts.

Shrub, a kind of liquor, consisting of acid fruits, sugar, and various substances to give flavor, prepared in rum or brandy.

Shude, a name given to the husks of rice, and other refuse of rice-mills, largely supplied to oil-crushers, as an adulterating ingredient for linseed-cake.

Shumac. See SUMACH.

Shunt. See RIFLE.

Shutters, safeguards to windows and doors, of wood or iron, closing horizontally or perpendicularly.

Shuttle, in weaving, the small boat-like instrument for passing the weft between the opened warps. — In foundry operations, a gate or stop to the sow or trough by which the melted metal is let out into the mould.

Shuttle-Race, a sort of shelf in the weaver's loom.

Siam, an extensive kingdom of S. E. Asia, consisting of 41 provinces, each governed by a Phaja, or great functionary, situated in the heart of the peninsula, between India and China, in lat. 4° to 21° 30′ N., lon. 97° 30′ to 107° E. Its area is estimated at 309,000 sq. m., and its pop. at about 5,700,000. There are several ports along its coast-line, in the Gulf of Siam, but foreign commerce is entirely carried on at Bangkok, a few miles up the river Menam, Paknam and Paklat being customs stations at its mouth. The chief products are rice, sugar, guava, mango, dauries, coffee, cocoanuts, tobacco, sago, and gums. Teak, sandal, rosewood, and the aquila-tree are the chief woodland products. The principal manufactures are vases, urns, and other vessels, in the making of which gold is embossed upon silver; gold-beating, iron-founding, and pottery. The chief exports are rice, sugar, gums, hides, horns, oil-seeds, drugs, dyewoods, and timber, etc. The chief imports are calico, linen, glass, cutlery, hardware, etc. The government is an absolute and hereditary monarchy, and there are two kings. The first is the actual monarch; the second is the nominal head of the army.

There is comparatively little trade and industry in the country, mainly owing to the state of serfdom in which the pop. is kept by the feudal owners of the land. Throughout the whole of Siam, the natives are kept to forced labor for a certain period of the year, varying from three to four months, in consequence of which the land, rich in many parts, is so badly cultivated as barely to produce sufficient food for its thin pop. Nearly the whole of the trade of foreigners, and in recent years many Chinese, not subject like the natives to forced labor, have settled in the country Though we have a consul at Bangkok, there is almost no direct intercourse between Siam and the U. States.

MONEY.

The *Tical*, or *Bat* = 12,800 *cowries*,	aver. rate of exch.	62 cts.
" *Spanish Dollar*	" "	$1.04.

The legal money of Siam is the Tical, a silver coin, with the device of an elephant impressed, weighing 236 grains troy. Spanish dollars, largely in use, are accepted in payment at the rate of 3 dollars for 5 Ticuls. In 1875, the government ordered a large quantity of bronze coinage from England, which is reported to get into extensive use among the people, taking the place of small paper notes of the value of 200 cowries, or 1 cent, previously in circulation.

WEIGHTS AND MEASURES.

The *Tael*	= 1⅓ oz. avoirdupois.
" *Picul*	= 133 lbs. "
" *Catty*	= 1⅓ " "
" *Chang*	= 4 yards.

The basis of all measures of weights in Siam is the Niu, equal to 8 grains of husked rice; while the measures of length are taken from the Kup, or Keub, that is, the length of the thumb to the middle finger of a grown-up man, and the Sok, the length of the lower part of the arm, from the end of the middle finger to the elbow.

Bangkok, the commercial seaport and capital of Siam, is situated on both sides of the river Menam, about 20 m. from the sea, in lat. 13° 38′ N., lon. 100° 34′ E. The river is navigable from the city for vessels of 350 tons, but there is a bar at its mouth, which at no time has more than 14 feet of water. The general appearance of *B.* is very striking, alike from its extent, the strange architecture of its more important buildings, and the luxuriant greenness of the trees with which it is profusely interspersed. The streets are in many cases traversed by canals, and the houses raised on piles, while a large part of the pop. dwell in floating houses moored along the river sides in tiers three or four deep. There is a great commercial activity. European manuf. are extensively imported, the natives being very ready to adopt new methods and machinery. A considerable number of European firms carry on business in the city, and the American government maintains a consul. Pop. 400,000.

Sicca, a term formerly very generally applied to the rupee as a money and a weight. The rupee was called a sicca only during the year after its coinage, and subsequently a sonaut or sunat rupee. See RUPEE.

Sicily, an island belonging to the kingdom of Italy, in the Mediterranean, the largest and finest in that sea, lying at the S. W. extremity of Italy,

from which it is parted by the narrow Strait of Messina; lat. between 36° 30′ and 38° 15′ N., lon. between 12° 20′ and 38° 15′ E.; area, 11,291 sq. m. *S.* is of an irregularly triangular shape, and is 180 m. in length by 120 in breadth.

A mountain-chain, seemingly a continuation of the Apennines, traverses the island E. and W., throwing off spurs, from one of which in the E. rises Mount Etna, the loftiest volcano in Europe, having a culmination of 10,900 ft.; neither the lakes nor the rivers are of any considerable size or length. The plains and valleys which compose the greater portion of the island are remarkably fertile, and yield large crops of maize, wheat, rice, pulse, all kinds of vegetables, and abundance of fruits; the silk-worm is largely cultivated. The minerals are marble, iron, copper, stone, agate, jasper, salt, and coal, while of sulphur the yield is enormous, — above 150 mines, finding constant work for 12,000 men. The manuf., generally unimportant, are silks, hats, furniture, skins, cotton, and cutlery; the exports comprise all native produce with linseed, manna, rags, and tanned leather. *S.* is divided into seven provinces, — Palermo, Messina, Catania, Girgenti, Syracuse or Noto, Trapani, and Catanisetta. Pop. 2,736,545.

Besides Palermo and Messina, noticed below, the chief ports are Alicata, Catania, Cefalu, Girgenti, Marsala, Mazzara, Sciocca, Syracuse, Trapani, Terra Nova, and Termini.

Messina, situated on the Strait of Messina, here about 2 m. wide, 200 m. S. S. E. of Naples, in lat. 38° 11′ 10″ N., lon. 15° 34′ 45″ E. The harbor, one of the best in the Mediterranean, is formed by a semicircular strip of land, and lies within a circuit of nearly 4 m.; it is of great depth, and perfectly secure in all weathers. *M.* extends above 2 m. along the bay and about half a mile up an acclivity which terminates in several considerable mountains. Its manuf. of silk goods and satins have long been famed, and its commerce is very extensive. Chief exports, silk, fruits, olive oil, wine, spirits, salted fish, linseed, sumach, essences, etc. Pop. (with suburbs) 111,854.

Palermo, a large city and seaport on the N. coast of the island, the light-house being in lat. 38° 8′ 15″ N., lon. 13° 21′ 56″ E. The Bay of Palermo is about 5 m. in depth, the city being situated on its S. W. shore. A fine mole, fully one quarter of a mile in length, having a light-house and battery at its extremity, projecting in a S. direction from the arsenal into 9 or 10 fathoms of water, forms a convenient port, capable of containing a great number of vessels. There is an inner port, which is reserved for the use of the arsenal. Ships that do not mean to go within the mole may anchor about half a mile from it, in from 16 to 23 fathoms, mole light bearing N. W. three quarters W. A heavy sea sometimes rolls into the bay, but no danger need be apprehended by ships properly found in anchors and chain cables. In going into the bay, it is necessary to keep clear of the nets of the tunny fishery, for these are so strong and well moored as to be capable of arresting a ship under sail. The chief manuf. is silk; cotton, oil cloth, gold and silver articles, and hardware are also produced. The exports consist principally of oranges, lemons, and other fruit. Pop. 219,398.

Sickle, a short, curved reaping-hook.

Sideboard, a shelf or fixed table in a dining-room.

Fig. 445. — View of Palermo.

Side-Saddle, a woman's riding-saddle with a pummel and one stirrup.

Sidings, long wedge-shaped boards, used for the sides of roofs of houses.

Sienna, a pigment of a yellowish-brown color, which, when burnt, assumes a reddish-brown color. The best comes from Italy.

Sieve, a strainer, riddle, or searce, with hair, wire or zinc bottom. — A bolting-cloth.

Sight, presentment. — Bills of exchange are frequently drawn payable *at sight* (*i. e.*, on presentation), or a certain number of days *after sight*. In the last case, the time begins to run from the period of presentment and acceptance. *Sight draft* and *sight bill* are bills payable at sight, generally without any days of grace.

Signals. Naval signals are of very great importance, and they may be divided into three classes: First, those which are made by the

sound of any particular instrument, such as a trumpet, horn, or fife; and to these may be added striking the bell and beating the drum. Second, signals made by displaying pendants, ensigns, and flags of different colors, or by lowering or altering the position of sails. Third, signals which are executed by rockets of various kinds, by firing cannon or small arms, by artificial fireworks, or by lanterns. By means of the "International Code of Signals for the use of all nations," all maritime countries use the same kind of signal flags; and having the signal book of each country printed in its own language, ships of different nationalities communicate as readily with each other as ships sailing under the same flag. Eighteen flags are provided, differing in color, size, shape, or device. Every flag represents a letter; and every letter is entered in the code book or book of signals. By hoisting one, two, three, or four flags at a time, 80,000 different combinations may be made among a choice of eighteen flags. One flag only denotes such useful little words as "Yes," "No," etc. Two flags denote various nautical phrases and expressions useful on shipboard. Three flags (of which there are several thousand combinations), denote short conversational sentences, questions, and answers, in great variety. For night signals, red, green, and white lights are used to represent those colors in the flags of the day signals, the green light taking the place of the blue bunting.

Signature, a person's name subscribed to a writing, check, or other document. — In printing, the letter or figure at the lower part of the first page of a sheet, intended to facilitate the arranging and gathering of the sheets for binding them.

Sign-Board, a board on which a person sets a notice of his occupation, or of articles for sale.

Signet, an engraved stamp; a seal.

Signet-Ring, a ring with a stone or metal shield for cutting letters, arms, or devices on.

Sign-Painter, a painter of sign-boards for storekeepers, etc.

Silhouette, a profile likeness or picture represented in black, the shadows and prominent features being touched in with gum.

Silk [Fr. *soie;* Ger. *Seide;* It. *seta;* Port. and Sp. *seda*], a soft, shining filament, the product of several species of caterpillar, particularly the *Bombyx mori* or silk-worm. This worm is about six or eight weeks in arriving at maturity, during which period it changes its skin four or five times, and ceases to feed for a short time previous to each change. When full grown it eats no more; but, choosing a convenient place, begins to discharge viscid pulpy twin filaments from the double orifice of its nose, with which it instinctively envelops itself as a defence against living enemies and a change of temperature; and it continues this operation till it has spun an oval case or ball, in which it remains as a chrysalis for about fifteen days, at the close of which it perforates the end of the silken ball, and comes out a winged moth, to deposit its eggs for a fresh generation, and very soon after to die. Those who cultivate the worm for silk do not suffer it to reach this last stage, because the silken fibre would be cut into small pieces, by the opening at which the moth escapes. When the whole quantity of silk is formed, they destroy the chrysalis by means of heat.

Silk occurs in various forms. *Cocoons*, *knubs*, or *husks* are the balls as formed by the worm, about the size of a pigeon's egg, and of a golden-yellow color. *Raw silk*, the state when simply wound off the cocoons into skeins or hanks, is in threads composed of several fibres, united by their natural gum. *Waste silk* is that part which is first wound off the cocoons in the operation of reeling; and such cocoons as being eaten through by the worm cannot be wound off by the reel, but are afterwards carded and spun; also of short ends arising from winding. Raw silk, before it can be used in weaving, is made to take one of three forms: 1st, *Singles*, the most simple process, consists in merely twisting the double thread projected from the twin orifice in the nose of the insect, in order to give more firmness to its texture: 2d, *Tram*, formed by twisting together not very closely, two or more threads of raw silk; and this description most commonly forms the weft or shoot of manufactured goods: 3d, *Organzine*, principally used in the warp, that is, to form the length of the web, is composed of two or more threads twisted separately, and afterwards combined together, the twist being then given in contrary directions. When thus prepared it is termed *thrown silk*. The worms are fed with the leaves of the mulberry-tree; and they are reared in a kind of nursery, called by the French a *magnanière*. Silk husbandry is extensively prosecuted in the south of Europe, — in Italy, where the annual production is about 12,000,000 lbs., chiefly in the northern provinces, and in France; also in China, India, and Persia. It is likewise pursued on a smaller scale in many other countries possessing a soil and climate favorable to the growth of the mulberry. The Indian silk, produced from a worm and leaf peculiar to Bengal, is inferior to that of France, Italy, and China, all produced from the *Bombyx mori*, reared on the white mulberry. In the U. States, attention has been repeatedly directed to the silk culture in different parts of the country, but everywhere, it seems, with indifferent success. The product of silk raised in the U. States fell from 61,552 lbs. in 1840 to 14,763 lbs. in 1850; while the last census gives no statistics of native silk culture. Systematic and intelligent effort, however, has been lately displayed in the line of silk-raising in this country. "Parties in N. Carolina," says the Commissioner of Agriculture, in a report published in 1879, "have found it sufficiently profitable, even with present drawbacks, to raise silk-worms, and ship the cocoons to France. One gentleman in Raleigh, Mr. E. Fasnach, has shipped two bales to Marseilles, each containing over 100 lbs. of choked cocoons. These have been sold at Marseilles for as high as 32 francs (or over $6) per kilogramme (not quite 2¼ lbs.), and the freight from Raleigh to Marseilles did not exceed $3 per hundredweight. The cocoons were raised by the children of the family; and aside from the silk product, Mr. Fasnach also produced a number of eggs, for which there is now a ready market abroad at $3.50 to $4 per ounce (of 26 grammes). Several other persons in different parts of the country have also reared sufficient quantities of cocoons to warrant New York brokers in offering from $1.50 to $2 per lb. for the same. When parties find it profitable to raise silk under these adverse circumstances, there can be no question as to the growth of the industry whenever a home market is furnished for the raw material, and that when once it shall have been demonstrated that there can be offered and paid for cocoons some stated sum that will yet allow a fair profit on the reeling, the industry will be fairly established, and private capital will not be wanting to seek profitable investment therein. There can be no question as to the adaptation of the larger part of our country to silk culture, or of our ability to grow the worms successfully. Experience has established these two facts, as it has the superior quality of American-grown silk. It is not so necessary to urge the cultivation of the mulberry as it is to establish first a market for the cocoons. In some parts of the South the best of white mulberries are already grown in large orchards, for the sake of the fruit, which is deemed most valuable food for hogs; and in case the mulberry-trees already grown should at any time be cut off by mildew and disease, as they were at the close of the multicaulis fever in 1839 and 1840, we have the advantage over Europe and other countries in being able to fall back upon the *Maclura*, which proves, when judiciously fed, to be as good as mulberry." — There were in 1875 in the U. States 180 silk manufactories, employing 14,479 operatives of both sexes, distributed as follows: New Jersey, 42 (5,414 operatives); New York, 70 (3,378 operatives); Connecticut, 21 (2,651 operatives); Pennsylvania, 23 (1,541 operatives); Massachusetts, 11 (1,249 operatives); California, 3 (100 operatives); other States, 10. The total capital invested was $14,708,184; total value of production, $20,082,482. Of this sum, thrown and spun silk, amounted to $3,863,325; sewing silks and machine twist, $5,766,684; broad goods and ribbons, $6,154,313; laces, braids, and trimmings, $4,298,196. — The great European mart for silk manufacture has been for long years and is still, up to the present day, the French city of Lyons. Of $24,013,398, total value of our imports of manufactured silks in 1879, 54.90 per cent came from France, 28.42 from Germany, 14.10 from England, 1.97 from Holland, and 0.61 from other countries. Of $8,371,025, total value of our imports of raw silk, China enters for $4,374,965; Japan, $2,191,287; France, $891,618; and England, $871,339. The importation of cocoons seems to have been almost entirely discontinued. The following table shows the value of our imports of raw and manufactured silk, for each of the ten years 1870-1879: —

Year.	Raw Silk.	Dress and Piece Goods.	Hosiery.	Other Manuf.
1870	$3,017,958	$12,624,353	$33,906	$11,245,789
1871	5,739,592	18,209,742	186,397	13,944,862
1872	5,625,620	20,295,251	106,924	16,046,443
1873	6,460,621	17,509,442	54,168	12,326,425
1874	3,854,008	15,618,976	73,618	8,304,188
1875	4,504,306	18,261,673	84,943	6,034,307
1876	5,424,408	17,620,575	77,776	6,047,616
1877	6,792,937	16,750,826	78,940	5,000,393
1878	5,103,084	13,861,195	136,201	5,840,576
1879	8,371,025	16,100,162	155,471	7,757,765

Manuf. — If the mere rearing of the worm and the production of the cocoons is simple, the *reeling* of the silk is by no means so, as the greatest skill is required to accomplish the work properly, and the value of a hank of silk depends as much on the skill of the reeler as upon the quality of the original thread. In the best cocoons the silk will measure upwards of a thousand feet in length, and, though it appears single, it is in reality composed of two threads, which are glued together and covered as they issue from the spinneret of the moth with a glossy varnish, which enables the worm to fasten the silk where it wills, and which is soluble in warm water. In countries where there are steam-reeling establishments, it is generally more profitable for the small raiser to sell his cocoons, and not go to the trouble and expense of reeling by hand; but, unfortunately, there is no market for choked cocoons in this country, and the raiser will be under the necessity of reeling his own silk if he wishes to make the most of them. It will be desirable, then, in this paper, to state the facts and principles which should govern the unwinding and reeling, for the benefit of those who may wish to use single basins and reels worked by hand. In the great reeling districts of France, everything is brought to such perfection in the *filatures*, or reeling establishments, by the aid of steam, that the hand reels have there almost gone out of use. But most of the silk is unwound by hand-power in China, and excellent silk may be made by dexterous management with a good hand-reel. The thread of silk as it unwinds from the cocoon is valueless for manufacturing purposes, several of them combined going to make the staple of commerce. The persons employed in unwinding silk are mostly women, one standing or sitting before each basin, of which she has entire charge. The basin is made of copper, and, in the large establishments, the water in each basin is heated by steam, at the control of the operator. The cocoons are plunged into the water, when it is near the boiling point, and moved about so that the gum which fastens the threads becomes uniformly and thoroughly softened. They are then beaten with a small birchen broom, having the tips split, so that the loose threads readily fasten to them. After beating a short time, the operator gets all the cocoons fastened, and, taking the bundle of threads, shakes the cocoons till each hangs but by a single one. She now takes up five or more threads (*brins*), according to the quality of silk wanted, unites them, and introduces the combined staple or strand (*fil*) into a little glass eye on one side of the basin. She then forms a second similar strand and introduces it into a second eye on the other side. The strands are then brought together, twisted several times, separated above the twist, and introduced into two other glass eyes or ringlets through which they are led, one to each end of the reel or *tambour*, which is kept revolving in a steady, rapid manner, and to which is also given a certain back-and-forth side motion. The great object in reeling is to get the threads uniform, rounded, well joined, properly freed from moisture, and so crossed on the reel that they will not stick or glaze, as it is termed. These objects are attained by the twisting and the to-and-fro lateral movement of the reel, as also by properly regulating the distance between reel and basin. The uniformity of the thread depends on the skill of the operator, who must supply a new thread as soon as one begins to give out. This is called nourishing the silk, and is done by dexterously casting, with the thumb, the new thread upon the combined strand, to which it immediately adheres. In this she must use much judgment, for the silk of a cocoon gradually gets lighter and finer as it approaches the end, and the uniformity of strand does not entirely depend on the uniformity in number of the individual threads forming it. Whenever the silk rises in locks the temperature of the water is known to be too hot, and when it unwinds with difficulty the temperature is, on the contrary, too low. The operator is supplied with a skimmer with which to remove all chrysalides and refuse silk; also, with a basin of cold water in which to cool her fingers, which are being constantly dipped in the hot basin. This constitutes the whole operation of unwinding, but before the skeins, as they come from the reel, are ready for the manufacturer they must undergo still further manipulation. The staple is first passed through a cleanser, consisting of a clasp lined with cloth, which catches any loose silk or other matter that may be adhering to it. It is then further cleansed and purged by being passed through four similar cleansers (*purgeurs*), then twisted about 500 times to the yard, then doubled and again twisted about 400 times to the yard. It is finally run on to reels about $1\frac{1}{2}$ ft. in diameter, and taken off and twisted in a peculiar knot or hank. Through all these operations the oscillating to-and-fro lateral motion is kept up, so as to produce the diagonal crossing of the strands, and it will be readily understood that each staple is, in the end, composed of ten or more of the simple threads first spun by the worm. The loose or flock silk, together with all which, from one cause or another cannot be reeled, is soaked in water for three days, boiled for one half hour in clear lye, washed in rain-water; and when dry, carded, and spun, it makes an inferior floss silk. — The chief processes whereby raw silk is brought to the woven state are the following: The silk is disengaged from the hanks in which it is imported, and wound on hexagonal frames called *swifts*, from which it is transferred to *bobbins* (Fig. 446).

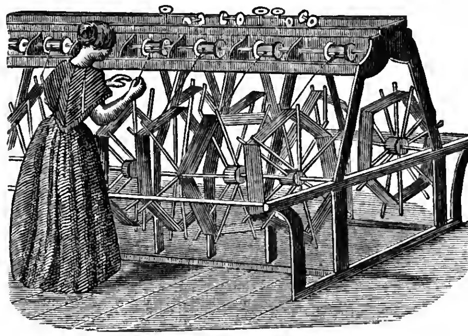

Fig. 446. — SILK-WINDER.

Different qualities of silk require different details of treatment; but the main treatment is the same for all. — To remove the little irregularities on the surface, each thread of silk is made to pass under the action of a kind of scraper of steel, or else between two steel rollers. This is done in the *clearing machine*, which transfers the clean fibre to other bobbins. — There then comes into use the *spinning machine*, which has a number of spindles placed upright, and mechanism to make them rotate with great speed. The bobbins on the clearing machine are placed in a row; each filament of silk is twisted to give increased strength, and other bobbins receive the twisted filaments. — The combining of filaments now begins. Two or more are twisted round each other in the *doubling machine* into a little cord or thread, hard or soft according to its purpose, but equable in tension in every part. Here, as in the other machines, the silk is transferred from one set of bobbins to another. — A further twisting and combining here takes place in the *throwing machine*, which acts nearly in the same way as the machine just noticed. For some purposes the spinning and the throwing are combined in one operation; and for some others a *throstle frame* is used. — The silk is usually dyed after the throwing, and is then transferred to the *glossing machine*, where the combined action of moist steam and stretching at once elongates the silken thread and gives it a gloss. Silk can be stretched in length one tenth, a change which cannot safely be attempted with flax, cotton, or wool. — The silk, having thus gone through all the processes of spinning and dyeing, is once more wound on bobbins, ready to be used as warp or weft, as the case may be. The silken thread, simply wound and cleaned, is called *dumb singles;* when wound, cleaned, and thrown, *thrown singles;* if single twisted, *tram;* if double twisted, *organzine;* if the natural gum is left in it, *hard silk;* if the gum has been removed, *soft silk; floss silk* is the outer portion of the cocoon, worked up into yarns for cheap handkerchiefs and shawls by processes somewhat resembling cotton-spinning; *sewings* is a name that explains itself. The *quality* of silk is denoted by the number of yards which go to a *denier*, equal to 24 grains, and equal also to $\frac{1}{24}$ of an ounce. For the weaving processes it will suffice to refer to LOOM, WEAVING, etc. All silk goods are noticed under their several headings. Mr. Cola gives an estimate of cost in England for a silk-mill of moderate size, containing all the appliances for spinning and weaving, from the imported hanks of silk to the finished *gros Naples* or other goods. There is the requisite supply of winding, clearing, spinning, doubling, throwing, stretching, glossing, and warping mills, etc., to feed 2,000 spindles, 100 looms, and 100 Jacquard machines; $13,000 in all, with $7,500 more for steam-engine, boilers, and mill gearing. *Imp.* duty: Raw or reeled from the cocoon, not manufactured, free; cocoons, and silk-worm eggs, free; silk in the gum, not more advanced than singles, tram, and thrown organzine, 35 per cent; twist, of silk, or of silk and mohair, 40 per cent; floss, 35 per cent; waste, free; for sewing, in the gum and purified, 40 per cent; spun, for filling, in skeins or cops, 35 per cent. — (February, 1875.) All goods, wares, and merchandise, not otherwise herein provided for, made of silk, or of which silk is the component

material of chief value, irrespective of the classification thereof for duty by or under previous laws, or of their commercial designation, 60 per cent (*Provided*, that this duty shall not apply to goods, wares, or merchandise which have as a component material thereof, 25 per cent or over in value of cotton, flax, wool, or worsted).

Silk-Cotton, a name given to the silky down or fibre obtained from the *Bombax*, *Calotropis*, *Cryptostegia*, and other plants, which is useful for stuffing pillows, paper-making, etc. See KAPOK.

Silk-Dresser, a stiffener and smoother of silk.

Silk-Embosser, one who ornaments silk by passing the plain stuff between rollers, the surfaces of which contain the desired pattern raised on one cylinder, and depressed or sunk on the other.

Silk-Grass, a name for the fine fibres of the *Agave vivipera*, and of *A. zuccœfolia*.

Silk Mill, the building or factory in which raw silk, as imported, is prepared for the weaver, the stocking-maker, or the sempstress, by spinning or twisting, and other processes. They are sometimes subdivided into silk-throwing mills and silk-spinning mills, the former being for the manufacture from good and perfect raw silk, and the latter from waste and inferior silk.

Silk-Plush, a material used for articles of ladies' dress; also very extensively for covering the stuff bodies of men's hats.

Silk-Printer, a stamper of silk.

Silk-Shag, a coarse, rough-woven silk, like plush.

Silk-Throwing, the process of spinning and preparing hard silk for warp and weft threads for the weaver; for yarn for the silk-stocking maker; for sewing-silk, and other purposes.

Silk-Waterer, one who clouds, waves, or waters silk, by passing two pieces placed lengthways between metallic rollers, where they are subjected to different degrees of pressure.

Silk-Weaver, a manufacturer of articles of silk in breadths for dress pieces, etc., or narrow strips for ribbons.

Silk-Weed, a name for the *Asclepias Syriaca*, the root of which has some medicinal properties. A sugar is made from the odoriferous flowers, which are gathered in the morning when they are covered with dew, and the cotton from the pods is collected to fill beds. On account of the silkiness of this cotton, Parkinson calls it Virginian silk. The plant is sometimes called Milk-weed.

Silk Weight and Measure. The size or substance of a silk thread is usually estimated by deniers. The ounce troy and the ounce *pois de marc* of Lyons, by the latter of which silk is tested in France and Italy, are equal in weight, but are differently subdivided. The ounce troy is divided into 20 pennyweights $\times$ 24 = 480 grains; the ounce of Lyons, pois de marc into 24 drachms $\times$ 24 = 576 deniers. The denier is therefore $\frac{1}{6}$ less than the grain troy. The English silk reel is 818 bouts of 44 inches = 1,000 yds. The French, 400 ells, or 475 metres = 520 yds. The standard of silk measure is about 400 yds.; that length of a single filament from China cocoons will weigh 2 deniers, and from French and Italian, $2\frac{1}{2}$. A 10-denier silk will then be the combined thread of 4 or 5 cocoons.

Silk-Worms' Eggs, the eggs of the silk-worm, called *seed* by the silk cultivators (Fig. 447). They are of a grayish tint and about the size of mustard seeds. They may be preserved a long time without deteriorating, provided they are kept free from damp, and not too many in the same packet. They are enveloped in a liquid which causes them to adhere to a piece of cloth or paper which is provided for the female to lay them on, and in this state they are more easily transported. They form an important article of commerce in India, China, Japan, Italy, and France. It is calculated that the product of an ounce of eggs eats upward of 1,200 lbs. of mulberry leaves, and furnishes about 100 lbs. of cocoons, which yield about 7 or 8 lbs. of reeled raw silk. One ounce of seed is usually worth in France about 50 cents. *Imp.* free.

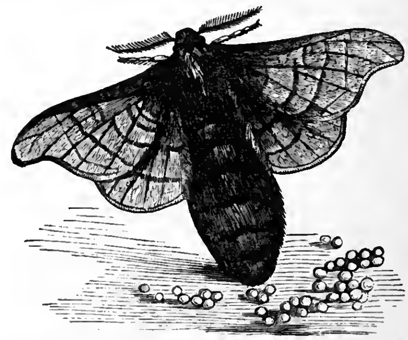

Fig. 447.—FEMALE SILK-WORM MOTH, LAYING EGGS.

Sill, the lower beam of a window or door frame.

Sillabub, a mixture of new milk, wine, sugar, and spices.

Sillery. See CHAMPAGNE WINES.

Silo, a pit, or subterranean store for keeping grain.

Silver [Fr. *argent;* Ger. *Silber;* It. *argento;* Port. *prata;* Sp. *plata*], a metal of a fine white color, without either taste or smell; being in point of brilliancy inferior to none of the metallic bodies, if we except polished steel. It is softer than copper, but harder than gold. When melted its sp. gr. is 10.474; when hammered, 10.51. In malleability it is inferior to none of the metals, if we except gold. It may be beaten out into leaves only $\frac{1}{100000}$ of an inch thick. Its ductility is equally remarkable: it may be drawn out into wire much finer than a human hair; so fine, indeed, that a single grain of S. may be extended about 400 feet in length. Its tenacity is such, that a wire of *S.* 0.078 inch in diameter is capable of supporting a weight of 187.13 lbs. avoirdupois without breaking. *S.* is easily alloyed with copper by fusion. The compound is harder and more sonorous than *S.*, and retains its white color, even when the proportion of copper exceeds one half. The hardness is at a maximum when the copper amounts to *one fifth* of the *S.*—Besides being used as a coin or money (see chiefly MINT and MONEY), and for the manufacture of *S.* plate and plated ware, its various properties give it a considerable range of useful application in the arts.

S. is found in many parts of the world, combined in various degrees with other substances, and sometimes pure. The occurrence of gold and *S.* in variable natural alloy is so general that they may almost be said to constitute but one mineral species, ranging from *S.* with a slight trace of gold, to gold with a slight trace of *S.* Native *S.* is found in masses and in arborescent and filiform shapes in veins of quartz, calcite, etc. *S.* does not seem to occur to any great extent as small particles in river sand and mud, like gold; and therefore there is nothing exactly analogous to the *washing* carried on with the more valuable metal. The actual mining processes are not peculiar, so far as they relate to digging the ore and sending it up to the surface (see MINING); but the depth of some of the mines gives a peculiarity to the mechanical arrangements. It is not by *smelting* that the *S.* is extracted from the ore, but mainly by *amalgamation*, a process that depends on the powerful affinity between *S.* and mercury. The sulphide found

in Saxony, one of the chief European sources, contains only about 80 oz. of *S.* in a ton of ore, a quantity so small that it would be dissipated altogether in any smelting process; the other constituents are oxides and sulphides of various kinds. The ore is spread out on a floor, sprinkled with a certain proportion of sea-salt, well mixed, and separated into heaps of about 4 cwt. each. Each heap is roasted in an oven, at a heat that grows higher and higher, and gives off various metallic and oxide vapors one after another, aided by frequent stirring; it is finally drawn from the oven as a deep-brown mass. This mass is ground fine between heavy millstones, sifted, bolted, and dressed. Then begins the amalgamation. The powder, with a certain quantity of water and of wrought iron in small pieces, is put into a barrel which rotates 20 times a minute; after this has gone on for two hours, mercury is added, and the whole rotated from 20 to 25 times a minute for 16 hours. A liquid amalgam formed by this process, separated from certain slimy matters which collect on the surface as a scum, is drawn from the barrel into a trough, and thence through an iron tube into a receiver. Nearly all the *S.* originally contained in the ore is now in this liquid amalgam. Every 20 tons of ore have taken up about 60 lbs. of iron and 11 lbs. of mercury. The amalgam having been made, the next thing is to drive off the mercury from it. By filtering through close canvas bags, some of the liquid mercury is separated from the amalgam, which now forms a paste. This paste is put into a distillatory furnace, which is a peculiar apparatus, specially adapted to preserve and restore the two valuable metals, *S.* and mercury. The mercury, influenced by the heat, rises as a vapor, sublimes around a vaulted chamber, and falls as metallic drops into basins of water. The mercury thus recovered is ready to be used again for other similar operations; while the non-volatile parts of the paste, containing *S.* with a great many other metals, remain in the furnace. By further processes of refining, the *S.* is separated from the other metals, and brought to a pure state. Great care is taken by subsidiary processes, to recover what little residue there may be of *S.* and mercury in the liquid, scum, sediment, paste, alloy, etc., in order that nothing may be wasted. See also SILVER, LEAD. — There are *S.* mines in Asiatic Russia; in Hungary, Saxony, Spain, Norway, and other parts of Europe; but the production of the *S.* mines of Mexico and Peru exceeded that of all other countries, up to the discovery of the famous Comstock lode on the E. flank of the Sierra Nevada, which, in a single year, produced more than $23,000,000 in gold and *S.* See NEVADA. No equally important argentiferous deposit has since been discovered; and, in view of the most recent exposures of vast bodies of ore at great depth on the Comstock, it may be doubted whether its equal was ever known before.

Estimated production of Gold and Silver in the U. States during the fiscal year 1879 (*from the Report of the Director of the Mint*): —

State or Territory.	Gold.	Silver.	Total.
	$	$	$
California	17,600,000	2,400,000	20,000,000
Nevada	9,000,000	12,560,000	21,560,000
Colorado	3,225,000	11,700,000	14,925,000
Montana	2,500,000	2,225,000	4,725,000
Idaho	1,200,000	650,000	1,850,000
Utah	575,000	6,250,000	6,825,000
Arizona	800,000	3,550,000	4,350,000
New Mexico	125,000	600,000	725,000
Oregon	1,150,000	20,000	1,170,000
Washington	75,000	20,000	95,000
Dakota	2,420,000	10,000	2,430,000
Michigan (Lake Superior)	....	780,000	780,000
North Carolina	90,000	....	90,000
Georgia	90,000	....	90,000
Other sources	50,000	47,000	97,000
Total	38,900,000	40,812,000	79,712,000

Annual production of Gold and Silver in the U. States, from 1855 *to* 1879: —

Year.	Gold.	Silver.	Total.
	$	$	$
1855	55,000,000	....	55,000,000
1856	55,000,000	....	55,000,000
1857	55,000,000	....	55,000,000
1858	50,000,000	500,000	50,500,000
1859	50,000,000	100,000	50,100,000
1860	46,000,000	150,000	46,150,000
1861	43,000,000	2,000,000	45,000,000
1862	39,200,000	4,500,000	43,700,000
1863	40,000,000	8,500,000	48,500,000
1864	46,100,000	11,000,000	57,100,000
1865	53,225,000	11,250,000	64,475,000
1866	53,500,000	10,000,000	63,500,000
1867	51,725,000	13,500,000	65,225,000
1868	48,000,000	12,000,000	60,000,000
1869	49,500,000	12,000,000	61,500,000
1870	50,000,000	16,000,000	66,000,000
1871	43,500,000	23,000,000	66,500,000
1872	36,000,000	28,750,000	64,750,000
1873	36,000,000	35,750,000	71,750,000
1874	33,490,902	37,324,594	70,815,496
1875	33,467,856	31,727,560	65,195,416
1876	39,929,166	38,783,016	78,712,182
1877	46,897,390	39,793,573	86,690,963
1878	51,206,360	45,281,385	96,487,745
1879	38,899,858	40,812,132	79,711,990

Silvering. — *S.* can be applied to the surfaces of wood, paper, metal, and other substances, by nearly the same processes as those described under GILDING, except that, to silver brass, the composition applied consists of chloride of *S.*, chalk, and pearl-ash, instead of *S.* and mercury. See ELECTRO-PLATING under head ELECTRO-METALLURGY. See also SILVERING MIRRORS.

Nitrate of Silver. — This important salt is made by dissolving *S.* in strong nitric acid. It crystallizes in square, anhydrous, colorless tables, and dissolves in an equal weight of water. It fuses when heated, and may be cast in cylindrical moulds, in which form it is used by surgeons as an escharotic, under the popular name of *lunar caustic.* When perfectly pure, it undergoes no alteration when exposed to light; but if the smallest portions of organic matter be present, it darkens perceptibly. When exposed to light in contact with organic matter, as in the ordinary photographic processes, it forms a dark brownish-purple compound of an organic nature, whose composition is at present but little understood. For photographic purposes, it must be perfectly neutral and pure, free from contaminations of nitric acid and organic matter. For this purpose, the ordinary co-called pure nitrate should be carefully fused and recrystallized. It is also used as a source of *S.* in the electrotype process, in silvering glass and in marking ink. *Imp.* duty: Ore, free; silver-plated metal, in sheets or other form, 35 per cent; silver leaves (package of 500 leaves), 75 cts. per package; nitrate, 40 per cent; manuf. of silver, n. o. p. f., 40 per cent.

Silver-Burnisher, a polisher or brightener of articles of silver.

Silver-Caster, a moulder or melter of silver.

Silver-Chaser, an embosser of silver.

Silvering Mirrors. The ordinary looking-glasses are coated on the back with a highly reflective white metal, which, though called silver, is really an amalgam of mercury, or quicksilver, and tinfoil. The process is a very remarkable one.

A large sheet of tinfoil is unrolled and spread out flat on a very smooth and level table of slate or of iron. It is floated all over with mercury, poured out from iron bottles. The sheet of plate glass, cleaned as perfectly as possible, is dexterously slidden along in a horizontal position upon the foil, in such a way that the foremost edge of the glass may push most of the mercury along before it, yet leave some of it between the foil and the glass in every part, while all air is driven out. This done, the glass is loaded with heavy iron weights in every part, — a thing which could not be ventured upon unless both glass and table were perfectly flat and smooth. The heavy pressure squeezes out the superfluous mercury from between the glass and the foil; and one end of the table being propped up to a certain angle, the superfluity slowly drains off. By this time the thin film of mercury has become a solid amalgam with the foil, and gives a brilliant reflecting surface as seen through the glass. This process is still generally adopted for large looking-glasses; but there are other methods by which a film of real silver is deposited on the back of the glass. In *Drayton's* method is used a silvering fluid made of nitrate of silver, ammonia, and alcoholic solution of oil of cassia. A thin layer of this fluid is poured upon the clean surface of the glass, and upon this is applied a reducing fluid made of alcohol and oil of cloves; the one fluid causes the silver to separate from the other, and to deposit itself as an exceedingly thin film of brilliant metallic silver, which adheres to the glass. In *Vohl's* method, adapted for the interior of glass globes and balls, gun-cotton is dissolved in hot caustic potash; and this solution is made to act upon nitrate of silver and ammonia in such a way as to precipitate the silver in a thin film. In *Steinheil's* method the agents used are nitrate of silver, caustic ammonia, caustic soda, milk, sugar, and water; and the mutual action of these substances is so brought about as to deposit a thin film of pure silver. In *Thomson's* method, used mostly to silver the interior of globes and bottles; in *Foucault's*, for silvering convex and concave mirrors in substitution of metallic specula for telescopes; in *Martin's* method; in *Petit Jean's*

method, — in all of these some oxide or salt of silver is the primary agent, so acted upon by other chemical agents as to deposit a thin brilliant film of metallic silver on the glass.

Silver-Lace, wire coated with silver, and woven into lace.

Silver Lead. A very beautiful process has been devised by Mr. Pattinson, of Newcastle, for extracting the silver which nearly all smelted lead contains. It depends on the fact that melted lead will become solid or crystalline sooner than melted silver.

The vessels used are hemispherical cast-iron pots, each containing about 3 tons of metal, and heated by a fire underneath: there are ten or twelve of them placed in a row. Pigs of lead being put in one of the pots, and the fire lighted, the lead melts, and a dross comes to the surface; this is removed, and the fire is put out. As the metal cools, it is kept stirred, and crystals of lead gradually form; these are removed by a large perforated ladle and transferred to the next vessel. This transfer goes on from one vessel to another, the lead losing portion after portion of its silver by successive processes of crystallizing, until at length all the silver is collected in what is called the *rich pot*, as part of a very rich silver-lead; while the poor or de-silvered lead is collected in the *market pot*, from which it is poured into moulds, and becomes the lead of ordinary commerce. In one variety of the process a little zinc is introduced to facilitate the separation of the silver from the lead. The lead is then *cupelled*, to extract the silver with which it has been enriched by the last process. The *refinery* or *cupel furnace* contains a cupel in the middle. This is an iron frame supporting a kind of large oval dish made of moistened bone-ash and pearl-ash. The lead, melted in a separate iron pot, is allowed to flow into the cupel when the latter is at a cherry-red heat. A dross soon forms, and then an oxide, which is blown off the surface by the action of a blast. As the lead wastes away by this, more is added, until the cupel contains 5 tons. After a time the weight is reduced to 2 or 3 tons, but all the silver remains in it. The charge is removed; another charge is treated in a similar way; and so on, until there is collected a quantity of rich lead containing 3,000 to 5,000 oz. of silver. Again treated in a furnace, this rich lead gives up its silver, which is obtained as a thick plate. All the dross and oxide are made to yield up their metallic lead again by treatment in a separate process. So successful is this refining process, that it becomes profitable even when the lead contains only 3 oz. of silver to the ton, and possibly even with ½ oz. If the lead contains antimony, tin, or copper, it is exposed to the action of air in a separate furnace before the refining, in order that these metals may be separated and removed in the form of oxides. If the pig-lead produced by smelting contains 10 oz. of silver to the ton, it is enriched to 300 oz. to the ton by the Pattinson process; and these 300 oz. are extracted by the cupelling or refining process, leaving the lead really better for ordinary purposes than it was before.

Silver-Leaf, thin foil of silver.

Silver-Paper, fine tissue paper for wrapping articles, etc.

Silver-Plater, an electrotyper.

Silversmith, a worker or dealer in silver; mostly combined with the business of jeweller, etc.

Simare, Simarre, a sort of long gown.

Similor. See Gold (Dutch).

Simblot, the harness of a weaver's draw-loom.

Singapore, a British island at the E. extremity of the Straits of Malacca, the seaport town of the same name being in lat. 1° 17′ 22″ N., lon. 103° 51′ 45″ E. This island is of an elliptical form; its length is about 27 m., and its breadth 14 m.; area, 224 m. Pop. of island, 99,500; of town, 56,000.

S. is separated from the mainland by a strait of the same name, of small breadth throughout, and less than half a mile wide in its narrowest part, which, in the early period of European navigation, was the thoroughfare between India and China. But the grand commercial highway between the E. and W. parts of maritime Asia now passes along the S. side of the island on which the town is built, between it and a chain of islands about 12 m. distant; the safest and most convenient channel being so near to *S.* that ships in passing and repassing come close to the roads. *S.* has been from its foundation a free port, open to the flags of every nation, and without either import or export duties on goods, the only import being a trivial charge on ships, towards the maintenance of the lighthouses on the E. and W. approaches to the roadsteads. To this circumstance, combined with the manifold advantages of its position, the settlement is indebted for its rapid rise to a commercial prosperity which is without example in the eastern seas. It has become an entrepôt in which are brought together and exchanged the products and manufactures of the western world, of India, Cochin China, Siam, the Malayan peninsula, and of the whole wide region of the Eastern Archipelago from its W. limits in Sumatra, to the meridian of New Guinea and the Philippines. The port, which is divided into two by a tongue of land, is capacious, and the water is deep enough for the largest vessels. The harbors are provided with every facility for an extensive commerce, and for fitting out and repairing ships. During the year 1878, 27 U. States vessels entered the port; the total value of exports to the U. States for that year was $3,976,714. The imports from the U. States, in comparison with the exports thither, are of trifling amount. The chief articles of export to this country are gambier, tin, sago, tapioca, black and white pepper, tortoise-shell, nutmegs, gutta-percha, camphor, coffee, rattans, and Japan-wood. The climate of *S.*, though hot, is healthy. Being only about 80 m. from the equator, there is, of course, very little variety in the seasons, the Fahr. thermometer ranging from 71° to 89°.

Singeing-Machine, a machine in which the fibrous down is removed from the surface of cotton cloth by passing it through a gas flame.

Singles, a name in the silk trade (a collective term), expressing a reeled thread of raw silk, twisted, in order to give it strength and firmness.

Single-Tree, a cross piece for fastening harness.

Singlo, a fine kind of green tea, with large flat leaves, not much rolled.

Sink, a drain or stone basin used in kitchens, etc., to carry off foul water.

Sinker, a lead weight for a net or fishing-line. — In a knitting-machine, a wheel with thin plates or projections, called wings, inclined to the axis, and used to depress or sink the yarn between the needles and below the beards.

Sinking-Fund, an appropriation for gradually paying off the debt of a Company or State.

Sinnet, spun-yarn; plaited straw for hats.

Sioux City and Pacific R. R. runs from Sioux City, Ia., to Fremont, Neb., 107.42 m.; leased line (Fremont, Elkhorn, and Missouri Valley R. R.), 51.09 m.; total length of line operated, 158.51 m. The Co. is located at Cedar Rapids, Ia. Cap. stock, $2,068,400; funded debt (1st mortgage, 6 %, due 1878), $1,628,000; government bonds, $1,628,320. Cost of construction and equipment, $5,350,074. This Co. has a land-grant of 60,000 acres, of which about 45,000 have been certified.

Sioux City and St. Paul R. R. runs from St. James, Minn., to Le Mans, Ia., 122.35 m. From Le Mans to Sioux City, 26 m., the Co. operates on the line of the Iowa division of the Illinois Central R. R. This Co., located at St. Paul, Minn., was organized in 1866, and the line was opened in 1872. Cap. stock, $2,800,000; funded debt, 1st mortgage, 8 %, $714,080; 2d mortgage, $582,160; equipment bonded, $108,500. Cost of construction and equipment, $5,404,859. This Co. has a land-grant of 638,313 acres, of which about 200,000 acres have been sold at an average of $6.51 per acre.

Siphoid, a French constructed vase or apparatus for receiving and giving out gaseous waters.

Siphon, a bent pipe or tube, having one hand longer than the other, used for drawing off liquids, or transferring them from higher to lower levels. See Decantation.

Sirup. See Syrup.

Sisal. See Mexico.

Sixpence, an English current silver coin, the half of a shilling.

Size, a liquid glue, made by boiling down in water the clippings of parchment, glove-leather, fish-skin, and other kind of skins and membrane. It is used in paper-making, by bookbinders, paper-hangers, whitewashers, and painters in distemper.

Sizing, pieces of skin and hide used for making glue.

Skate, a wooden or gutta-percha shoe or sandal, with a curved iron runner, for shooting along, moving rapidly, or sliding on ice. They were formerly largely imported from Germany; but the American trade is now almost entirely supplied by the New England and New York manufactories. *Imp.* duty: costing 20 cents or less per pair, 8 cents per pair; costing more, 35 per cent.

Skeet, a long scoop used for throwing water on the sails and decks.

Skein, a small hank of thread or silk, etc.; a quantity of cotton-yarn after it has been taken off the reel. The skein contains 80 threads of 54 inches; 17 skeins make a hank; 18 hanks a spindle.

Skelp, a name for the rolled metal or welding of wrought iron, from which a gun-barrel is made.

Sketch, an outline or general delineation of anything.

Skewer, a metal or wooden pin for keeping meat together; metal skewers for kitchen use are sold in sets of sorted sizes.

Skew Gearing, cog-wheels with teeth placed obliquely, so as to slide into each other and avoid clashing.

Skid, an iron shoe or socket for checking the revolution of a wheel of a carriage when going down a hill, — otherwise called *brake*, and acting on the same principle as the brake of a railway-car. — In the U. States, a lengthy square piece of timber, along which something is rolled, or by which it is supported. — On shipboard, any beam or timber used as a support for some heavy body, to prevent its weight falling on a weak part of the vessel's structure. — *Skid-beams*. Timbers laid crosswise in a ship's waist, to sustain the larger boats, the launch in particular.

Skiff, a small light boat resembling a yawl.

Skillet, a small metal pot or kettle with a long handle.

Skim, to remove the scum from the surface of liquids.

Skim-Colter, a plough cutting-knife for paring land.

Skimmer, a perforated ladle or flat dish with a handle for taking the scum from a boiling solution, or from the water in which an object is boiled.

Skimmings, waste substances skimmed off; fat from a saucepan in which meat is boiled; thick sirup or scum in sugar-boiling, etc.

Skin, a husk or hide, a wine-bag or water-bottle. See Skins.

Skinner, a leather-dealer, a furrier. — A butcher who strips off the pelts from carcasses.

Skins [Fr. *peaux;* Ger. *Felle;* It. *pelli;* Port. *pelles;* Sp. *pieles*]. The term is applied in commercial language to the skins of those animals, — as deer, goats, kids, lambs, etc., — which, when prepared, are used in the lighter works of bookbinding, the manufacture of gloves, parchment, etc.; while the term hides is applied to the skins of the ox, horse, etc., which, when tanned, are used in the manufacture of shoes, harness, and other heavy and strong articles. *Kip* is a term used in trade to distinguish heifer-skins, or such as are between the ox and cow hide and the calf-skin. See Fur, Hide, Leather, and the names of the different animals.

Skin-Wool, wool pulled from the dead skin, not sheared from the live animal.

Skip, in sugar-making, a charge or strike of sirup from the coppers. — In mining, a kind of bucket employed in narrow or inclined shafts where the hoisting-device has to be confined between guides.

Skipper, a ship-master or captain of a small craft.

Skipping-Rope, a child's short cord for skipping over, often sold mounted with handles.

Skirret, a plant, the *Sium sisarum*, the sweet, succulent roots of which, being nutritious and subaromatic, are employed in cookery, in the same way as *Scorzonera*.

Skirt, the flaps and lower part of a man's coat below the waist. — The loose, flowing breadths of a woman's dress attached to the body.

Skittle-Ball, a flat ball of hard wood for throwing at skittles, or nine-pins.

Skittles, shaped blocks of wood, used as nine-pins, to be aimed at with a skittle-ball.

Skive, the iron lap used by diamond-polishers in finishing the facets of the gem.

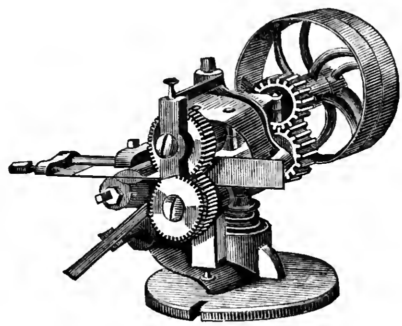

Fig. 448. — Tripp's Counter-Skiver.

Skiver, a paring tool or machine for leather, of which there are several kinds. The skiver or *skiving-machine* (Fig. 448), is used for cutting welts and rands, and skiving taps, counters, etc. — An inferior kind of leather used for hat-linings, pocket-books, work-boxes, toys, and other cheap purposes. It is made of sheepskins, split in two by a machine, when in the state of pelt, tanned by immersion in sumach, and afterwards dyed.

Skylight, a window in the roof of a house, or an apartment; or in the deck of a ship, giving light to the cabin.

Sky-Sail, a light upper sail of a ship, set above the royal.

Sky-Scraper, a name given to the sky-sail when it is of a triangular shape.

Slab, a flat piece of stone; a plane or table of slate or marble; the outer plank of a log of timber; a small mass of metal run into a mould; about thirty slabs of tin go to the ton.

Slack, a kind of small broken coal, used for smiths' purposes, sometimes mixed with better coal for fuel in engine fire-grates. — The loose part of a fixed rope.

Slag, a molten vitreous product of metals or minerals, after fusion in blast-furnaces; the scoria left after smelting metal, which is now applied to various useful purposes. The slag of iron-works is usually called cinder. Silica, alumina, chloride of calcium, and alum are obtained from slag, and it is cast into table-tops, and architectural ornaments, which take a beautiful polish. It may also be used for roofing, like rough glass, and in thin slabs, like Dutch tiles, instead of plaster. It was formerly only used for road-making or for rough walls.

Slaked-Lime, lime reduced to a powder.

Slam, a name given to the refuse from alum works.

Slat, SLOAT, a piece of wood used as a stretcher; as, the bar of a chair, the sloats of a cart.

Slate [Fr. *ardoise;* Ger. *Schiefer;* It. *lavagna, lastra;* Sp. *pizarra*], a fossil or compact stone that may be readily split into even, smooth, thin laminæ. There are several varieties of this valuable mineral, the prevailing colors being gray, blue, and brown. But the tints are very various; and *S.* are often marked with streaks of a different color from the ground. Mineralogically, *S.* is nothing more than a pure clay; nor does there seem any reason to suppose that any approach is made in it towards crystalline structure. As, however, no other rock shows this tendency to split indefinitely, the case is one of great interest. Practically, *S.* is very valuable, owing to its peculiar facility of splitting, and the perfectly smooth natural face which it presents. Its hardness and compactness preserve it from all weathering by mere exposure, though, when ground down, it easily passes back into fine clay. For a long time *S.* was used almost exclusively for roofing; but slabs or thick *S.* are now used in house fittings; as in strong rooms, powder magazines, larders, partitions, baths, stables, floors, drains, etc. For all these, and many like purposes, its perfect resistance to the atmosphere, to all chemical influences, and to the passage of heat, render it invaluable. It is very largely used also for enamelling; the surface of enamelled *S.* being made to represent marble of all kinds with wonderful accuracy, and resisting almost all wear. Thus, for mantelpieces, billiard-tables, ornamental slabs, and furniture, it has no equal, its cheapness being such as to drive other material out of the market. Quarries of great magnitude are worked in Cornwall, Wales, Scotland, and Ireland. The product of the Welsh quarries was formerly largely exported to the U. States, but this business has received a serious check since the opening of valuable quarries in Vermont, Maine, New York, Pennsylvania, Maryland, and other States. Roofing *S.* are made into a variety of sizes and shapes, and are sold by what is termed in the trade "squares," a square meaning 10 square feet. The *S.* used in schools are of various sizes, as 4 × 8 inches, or 8 × 12. They are framed with wooden frames (those of the oval form or with rounded corners are the best), and manufactured on a very large scale in Pennsylvania, Vermont, and Maine.

Imp. duty: *S.*, and all manuf. of *S.*, n. o. p. f., 40 per cent; roofing *S.*, 35 per cent.

Manuf. — All the arrangements for working up *S.* into useful and ornamental forms are made dependent on the peculiarly flat and thin structure of this kind of stone. The blocks are split soon after being quarried, else they lose their property of easy separation. Those intended for roofing are split to the required thickness, and made quadrangular, being left to the slater for further treatment. In making billiard-table tops, chimney-pieces, and other large slabs of smooth *S.*, the *S.*, after being split into slabs of the proper thickness, are cut to the right length and breadth by circular saws revolving rather slowly. The surfaces are smoothed by planing-machines, gradually worked from end to end, and from side to side. Mouldings and beadings are made by planing tools specially shaped. A finished *S.* surface is sometimes made to imitate granite or colored marble by being rubbed smooth, japanned with various colors and devices, baked to harden the japan, smoothed with pumice-stone, and polished with rotten-stone. *S.* is not well suited for turning or for carving, owing to its liability to chip in one particular direction. Some soft kinds, however, are turned to make *S.* pencils; other *S.* pencils are cut into shape, or are sometimes made of damped *S.* powder pressed into form.

Slaughter-House, ABATTOIR, a place where beasts are slaughtered for market.

Sleazy, lacking firmness or consistence of texture or body; thin, flimsy, flaccid; as, *sleazy* muslin.

Sled, SLEDGE, a vehicle on runners, used for hauling loads. It corresponds to the wagon as the sleigh does to the carriage among wheeled vehicles, the two latter being intended for passengers. — *E. H. Knight.*

Sledge, a large, heavy hammer, used chiefly by iron workers, and otherwise called *sledge-hammer.* See SLED.

Sleeper, one of the pieces of timber employed to support others, and laid asleep, or with a bearing along their own length; *sleepers* denote more particularly those timbers which are placed lengthwise on walls to support the joists of a floor. Sleepers are also employed on railroads as longitudinal parallel bearings for the rails to rest upon; in this sense, they are usually termed *stringers;* when lying across the road-bed, as they now generally are, they take the name of *cross-sleepers* in England, and *cross-ties* in America. See RAIL. — One of several knees which connect the transoms to the after-timbers on a ship's quarter; one arm of the sleeper lies on the foot-waling, and the other extends up the transoms; also termed *transom-knees.* — In glass manufacture, a large iron bar laid at right angles with smaller ones, which, while checking the passage of coals, allows the ashes to go through.

Sleeping-Partner, a dormant partner; one who puts in capital, but does not take any share in the business.

Sleetch, the thick mud or slush lying at the bottom of rivers.

Sleeve, the part of a garment which covers the arm.

Sleigh, a pleasure or passenger vehicle on runners.

Slice, anything broad and thin, like a slice; as, 1, a peel or fire-shovel; 2, a broad, thin piece of plaster; 3, a spatula; 4, a broad, thin, hatchet-shaped knife or carver.

Slicer, a name for the slitting-mill or circular saw of the lapidary.

Slide, an inclined plane down which logs are driven to a lower level. — A vein of clay intersecting a lode, and producing a vertical dislocation.

Slide-Rest, an appendage to the turning-lathe, to enable the workman to advance from end to end of a long piece of work, such as a pillar or cylinder; not only so, it enables him to perform work, such as the turning of metals, which would otherwise over-fatigue his muscles.

The slide-rest is attached to the lathe, but in such a way as to have a right-and-left motion. The cutting tool is held in a sort of vice; the vice moves by means of a slide which the workman governs by a screw-handle. His part of the work consists, not in working the tool, but in regulating the movement of the slide and the vice. Another screw-handle regulates the depth of the cut to be made by the tool; one screw enabling him to work *along* the piece of metal, and the other *across* or *around* it. By a further adjustment the apparatus is made self-acting. A slide-rest is always so constructed as to be shifted easily nearer to or further from the work, so as to adapt itself to different diameters. By one adjustment a cone may be turned, either solid or hollow, instead of a cylindrical surface; and a graduation of the slide into inches and fractions of an inch enables the workman to insure great accuracy. A peculiar kind of slide-rest is employed in *rose-engine turning*, to produce those wavy curved lines, so characteristic of that style of adornment, as seen in watch-cases, for instance.

Slide-Valve, in locomotive engines, the valve placed in the steam-chest to work over the steam-pots. It regulates the admission of steam to the cylinder from the boiler, and also the escape of steam from the cylinder to the atmosphere.

Sliding-Rule, a mechanical aid to calculation. It consists of three slips of wood connected by pieces of brass. The slips are covered with engraved lines and marks of various kinds, denoting

numbers, inches, rhumbs, angles, sines, tangents, logarithms, etc.; and by certain sliding movements of these slips, calculations can be made.

Slim, to shuffle over work.

Sling, a leather loop or cord for throwing stones. — A brace or support of any kind. — A drink composed of equal parts of spirit and water sweetened.

Slings, ropes or iron bands for securing a yard to the mast. — Tackle with hooks passing round a cask or package, to hoist or lower it.

Slink-Lamb, one that has been dropped or born prematurely. The soft skin of such is used for glove-linings and military purposes.

Slip, a narrow dock or place for hauling up a ship, or building a ship on. — A leash for holding a dog. — A woman's muslin or satin underskirt or petticoat. — A printer's galley-proof of a column of type. — A quantity of yarn. — The rubbings of grindstones. — A twig, separated from the main stock for planting. — A pew or seat in church. — An opening between wharves or in a dock. — A clay cream or cement for attaching pieces to crockery ware.

Slipper, an easy shoe of different materials, which may be slipped on with ease and worn in undress.

Slit-Deal, in England an inch and a quarter plank cut into two boards.

Slitting-Mill, a thin sheet-iron disk used in slicing by the lapidary. — A mill for making nail-rods.

Slitting-Saw, a machine for slitting scantling, boards, etc., into thin planks.

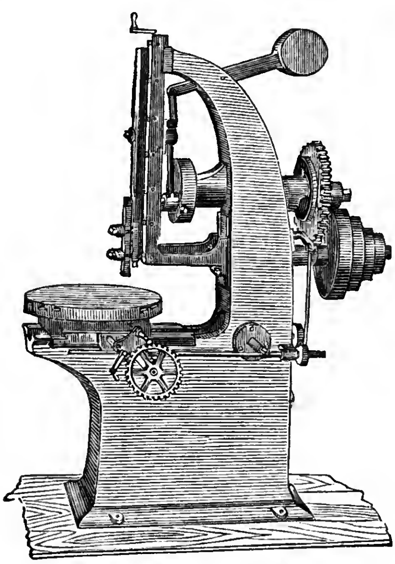

Fig. 449. — Seller's Slotting-Machine.

Sliver, a continuous strand of cotton or other fibre, in a loose, untwisted condition, ready for *slubbing* and *reving*, preparatory to being spun. The process is effected by the *finishing-card*. — *E. H. Knight.*

Sloop, a cutter; a one-masted fore-and-aft-rigged vessel, having its main-sail attached to a gaff and lower boom.

Slop-Basin, a crockery-ware basin, forming part of a tea-service, for emptying the dregs from the tea-cups into.

Slope, an inclination or gradient.

Slop-Pail, a metal bucket for chamber use.

Slops, ready-made clothing; a seaman's name for all kinds of clothing, or fabrics suited for clothing, and bedding, supplied from the ship's stores.

Slot, a bolt or bar.

Slote, a trap-door in the stage of a theatre.

Slot-Hound, a blood-hound.

Slotting-Machine, a machine in which a tool moves vertically, in the manner of a mortising chisel, so as to cut out slots or mortises, or to pare round the edge of any object requiring to be made fair and smooth round the edge.

Slub, Slubbing, a preparatory thread or roll of wool drawn out and slightly twisted in the first spinning frame, used for the weft in cloth-making.

Slubbing-Billy, the first spinning frame or machine for preparing wool in threads from short lengths of scribbed wool, called cardings.

Slubbing-Machine, a machine for drawing the slivers or laps of cotton, and twisting and winding them on bobbins.

Slug, a small leaden bullet.— Half-roasted ore.— A heating iron for hatters and tailors. — In printing, a strip of metal less than type high, and as long as the width of the column or page. Slugs are used to fill out a short page or other blanks.

Sluice, a frame of timber, stone, or other solid substance, serving to retain and raise the water of a river or canal, and, when necessary, to give it vent.

Slush, soft mud; a name on shipboard for the grease of pork and beef skimmed from the ship's coppers; usually, like the refuse fat in kitchens, the perquisite of the cook.

Slush-Tub, a vessel for holding grease.

Smack, a small sloop, a cutter or fishing-boat.

Small Arms, a general designation for firearms of the musket class, to be held by two hands, and those of the pistol class, to be held in one hand, as distinguished from cannon or artillery. Irrespectively of mere size, they differ one from another in the character of the bore, the mode of loading, the mode of firing, and the repeating. See Gun, Revolver, Rifle, etc.

Small Coal, Smalls, the coal which passes through the screens, about the size of a small hazel nut.

Small Craft, decked or half-decked boats and vessels; all under 100 tons.

Smallwares, a trade name for knitting and reel cotton, ribbon, wire, webbing, tape, fringes, braid, buttons, laces, bindings, etc.

Smalt, a vitreous substance obtained by melting together zaffres, a regulus of cobalt, potash, and silicious matter, and grinding the produce to a fine powder, commercially known as powder-blue. It is employed to give a blue tinge to writing-paper, linen, and starch, and, not being affected by fire, is much employed in painting earthenware. It is mostly made in Sweden. *Imp.* duty, 20 per cent.

Smear, a stain or daub.

Smectite [Fr.], a kind of fuller's earth.

Smelling-Bottle, a small, fancy glass bottle carried by a lady, containing pungent salts to sniff at.

Smelling-Salts. See Ammonia.

Smelt, a small, delicate fish of the salmon family, the *Osmerus viridescens*, caught in great abundance along the coasts of Massachusetts and Maine, and in the winter season largely sold fresh in the Boston and New York markets.

Smelting, the process of melting or fusing ores for the purpose of extracting the metal. See Blast Furnace, Copper, Iron, etc.

Smiddum-Tails, in mining, the sludge or slimy portion deposited in washing ore.

Smiddy, Smithy, a smith's shop; a blacksmith's forge.

Smith, a forger of metals by heat and blows; one who strikes metal with a hammer. There are whitesmiths, blacksmiths, and general smiths.

Smith and Iron-Founder, a worker in metals; one who has a foundry.

Smitt, fine clay or ochre made up into balls, for marking sheep.

Smock-Mill, a wind-mill with a revolving top, the frame and sails of which can be moved round to the wind.

Smoke, the vapor of burning vegetables or minerals. — To cure and dry animal substances by smoke.

Smoke-Black, another name for lamp-black.

Smokers' Articles. Tobacco pouches, cigar-cases and stands, cigar-holders, pipe-stems, and pipe mouth-pieces, and such like articles are all embraced under this general head in the tariff laws of the U. States. Pipes are not included, as they are specifically provided for. — *T. McElrath*. *Imp.* duty, 75 per cent.

Smoke-Stack, the chimney or funnel of a steamer or locomotive.

Smoking-Pipe, a bowl and connecting tube made of baked clay, stone, wood, or other material, and used in smoking tobacco.

Clay, in its various forms, still maintains a pre-eminence, and is used nearly all over the globe for making pipes, the commoner kinds, which are made in Devonshire, England, varying in price from 50 cents to $1.20 per gross. They are also largely manufactured in Holland, and of a finer quality in France. Those of porcelain are manufactured in Germany, the finer kinds being ornamented by painting, which is in some cases of a very artistic order, commanding a high price. — Red-clay pipes, with wide mouths, are made in Turkey and Algeria. Some are ornamented by stamping, and others are gilded with arabesque designs. The stems are of cherry or jessamine, with amber mouth-pieces, and the whole affair is often elaborately ornamented. — The hookah, or nargileh, has a very large bowl, generally provided with a water chamber, and may have several long flexible tubes, so as to accommodate a number of smokers at the same time. These are made in Turkey and Algeria, and often have richly carved bowls of solid silver. — The so-called "brier-root" pipes should be, as their name imports, made from the root of the brier, which is peculiarly incombustible and enduring, but in fact many other species of wood are employed. These are manufactured in Germany and France, particularly in the latter country, where St. Claude, in the Jura, has a monopoly of the commoner kinds. The more expensive carved varieties are made in Paris, and sometimes have a lining of meerschaum. See Meerschaum. *Imp.* duty: meerschaum, wood, porcelain, lava, and all other tobacco-smoking pipes and pipe-bowls, not otherwise provided for, 75 per cent, and $1.50 per gross; clay pipes, common or white, 35 per cent.

Smoothing-Iron, a flat iron to be heated, used by tailors and laundresses.

Smuggler, a contrabandist; one who privately and fraudulently brings in foreign goods without paying the customs duties; a vessel engaged in smuggling.

Smuggling, the offence of importing prohibited articles, or of defrauding the revenue by the introduction of articles into consumption, without paying the duties chargeable upon them. The penalty for smuggling in this country is fixed by the act of Congress, Aug. 30, 1842, as follows: That if any person shall knowingly and wilfully, with intent to defraud the revenue of the U. States, smuggle or clandestinely introduce into the U. States any goods, wares, or merchandise, subject to duty by law, and which should have been invoiced, without paying or accounting for the duty, or shall make out, or pass, or attempt to pass through the custom-house any false, forged, or fraudulent invoice, every such person, his, her, or their aiders and abettors, shall be deemed guilty of a misdemeanor, and, on conviction, shall be fined in any sum not exceeding $5,000, or imprisonment for any term not exceeding two years, or both, at the discretion of the court.

Smut, a mildew or blight in corn, caused by a species of *Uredo*, which destroys the interior of the grain; four millions of the small powdery spores may be contained in a grain of wheat. The *smut-machine*, as first invented, consists of a reticulated cylinder, inside of which are a number of brushes attached to the arms of a reel; by the action of the brushes and the current of air generated, the smut is driven through the meshes or perforations of the screen.

Smyrna. See Turkey.

Snaffle, a bridle with a slender or simple mouth bit.

Snag, the name given in North America to a projecting stump of a tree in a river.

Snag-Boat, a steam-boat fitted with an apparatus for removing snags, or obstructions to navigation in rivers.

Snails, mollusks of the genus *Helix*. The great vine snail, *Helix pomatia*, is esteemed as a table luxury on the Continent, and in other localities: on the shores of the Mediterranean they are boiled in the shell and eaten with rice. In some countries, as in Switzerland and parts of France, snails form a considerable article of commerce. They are fed by thousands in places called *escargatoires*, which are made on purpose for them. They are used, boiled in milk, for diseases of the lungs.

Snakeroot. See Aristolochia.

Snake-Stone, a kind of hone slate, or whetstone obtained in Scotland, and also known as Ayr stone.

Snap, a catch, or small fastening to a bracelet, necklace, purse, or book lock. — A mousing hook for harness.

Snarling, the process of forming hollow vases out of sheet metal, by the repercussion of a long-beaked tool (called *snarling-iron*) when struck by a mallet.

Snatch-Block, an iron-bound wooden single block with a hook at the end, or an opening below the sheaves, to receive a rope.

Snath, Sneath, Sned, the helve of a scythe; the handles are *nibs*.

Snider-Rifle. See Gun.

Snipe, a wild bird, the *Scolopax gallinago*, which is much esteemed as a delicious and well-flavored dish.

Snow, a two-masted vessel with a small supplementary mast for carrying a try-sail.

Snow-Plough, a machine for clearing away snow from railroad tracks.

Snow-Sweeper, a vehicle or contrivance adapted for removing snow from common roads.

Snuff [Fr. *tabac à priser;* Ger. *Schnupftabak;* It. *tabacco da naso;* Sp. *tabaco de polvo*], a powder still used as an errhine, but by no means so commonly as it was formerly. Tobacco is the usual basis of snuff; but small quantities of other articles are frequently added to it, to vary its pungency, flavor, scent, etc. Though substantially the same, the kinds and names of snuff are infinite, and are perpetually changing. There are, however, three principal sorts: the first, granulated; the second, an impalpable powder; and the third, the bran or coarse part remaining after sifting the second sort. Unless taken in excess, no bad consequences result from its use. *Imp.* duty, 50 cents per lb., and internal revenue tax, 33 cents per lb.

Snuff-Box, a small box for the pocket to con-

tain snuff, made in endless variety, and of different material, — wood, metal, *papier-mâché*, etc.

Soap [Fr. *savon;* Ger. *Seife;* It. *sapone;* Sp. *jabon*]. *S.* is, in principle, very little more than the artificial combination of some kind of oil or fat with some kind of alkali. Such a compound renders soluble in water the dirt and grease which accumulate on the skin, clothes, table-linen, stairs, floors, etc.; and herein we have the philosophy of *washing* succinctly expressed. As there are many kinds of oil and fat, and many kinds of alkali, so may there be many kinds of *S.* produced from them. Ordinary *S.* is freely soluble in both hot and cold water. But if any of the earths, such as lime, be present, an insoluble compound is immediately formed; or, in common language, the *S.* curdles, from the water being hard. Ordinary *S.* are of two kinds, — *soft* and *hard.* Soft *S.* is a combination of some fatty or oily substance with potash, and contains an excess of alkali; hence it is used for cleansing purposes where very highly detergent powers are required. The hard *S.* are combinations of the fatty acids with soda; the principal varieties being *yellow S.*, made from tallow and palm-oil, and containing a certain proportion of resin to give it lathering properties; *curd S.*, which is made from tallow, only a small portion of olive oil or lard being added, to give it softness; *mottled S.*, which is prepared from tallow, palm-oil, and kitchen-stuff, and contains a portion of insoluble iron *S.*, giving it a marbled appearance. *Marseille* and *Carlisle S.* are made of olive-oil and soda, a small quantity of sulphate of iron and sulphuretted lye being added to them while in a pasty condition. The object of marbling *S.* with an insoluble matter is to show that they contain but little moisture, since, if too large a proportion of water were present, the coloring matter would sink to the bottom and remain there, instead of being diffused through the mass. The hard laundry *S.* are in bars, and put up in boxes of about 100 lbs; the soft *S.* are sold by the barrel, toilet *S.* by the dozen cakes. The manufacture of *S.* has become a very important branch of our national industry, and while the imports of *S.* into the U. States are now limited to some extra-fine toilet *S.* from France and England, our exports for the year 1879, besides toilet *S.* valued at $30,827, amounted to 12,297,689 lbs., valued at $621,311.

Manuf. — The manuf. of the different *S.* is very similar, differing only in minor details. An alkaline lye is first prepared in large iron boilers, called *coppers*, heated by steam, by boiling in them a mixture of soda, ash, lime, and water. After boiling for some time, the steam is turned off, and the lye is allowed to cool, carbonate of lime being deposited. The clear lye is then drawn off, weakened by the addition of water, and added to the tallow, fat, or oil, in the proportion of 150 gallons of weak lye to one ton of fat. When ebullition takes place, stronger lyes are added by degrees until the *S.* feels no longer greasy. Common salt is then added, which separates the glycerine and other impurities derived from the grease. These are drawn off and thrown away, stronger lyes being added, and the boiling continued until the whole of the soap separates. It is then transferred to frames to cool, a small portion of the lye contained in the *S.* gradually separating and accumulating in the lower part of the frame. This portion is poured off and added to the next charge. When perfectly hard, which occurs in three or four days, the *S.* is cut up into bars with wires. *Curd S.* is generally remelted, and forcibly stirred or *crushed* to break up the grain. It is the purest commercial *S.* *Fancy S.* are made from pure curd *S.*, scented with various perfumes, and colored with a variety of tints to suit the prevailing fashion. *Honey S.* contains no honey. It is made of good yellow *S.*, scented with oil of citronella. *Real old Brown Windsor S.* is curd *S.* which has turned brown by age. It is now, however, made artificially, by mixing caramel with white *S.* *Transparent S.* is made by dissolving white *S.* in spirit and evaporating. *Glycerine S.* is prepared by heating the fat with alkali and a little water to about 400° F. for two or three hours, and running the mass at once into moulds. It is, of course, a mixture of soap and glycerine. *Imp.* duty: all *S.*, n. o. p. f., 1 cent per lb., and 30 per cent; fancy, honey, perfume, transparent, and all descriptions of toilet and shaving *S.* and wash balls, 10 cents per lb. and 25 per cent; stocks, free.

Soap Stock, any kind of grease or fat used in the manufacture of soap.

Soapstone, Steatite, hydrated silicate of magnesia, with a smooth greasy feel like that of soap, and so soft as to yield to the nail. It is a massive variety of talc, which, when pure and compact, is much used as a refractory material for lining furnaces, being infusible in any ordinary furnace heat. It is easily turned in the lathe, or cut with knives and saws, and is made into culinary vessels. When very strongly heated, *S.* loses the small portion of combined water which it contains, and becomes harder and susceptible of polish. In this state it is made into jets for gas burners, which have the advantage of not being liable to rust or corrosion. When reduced to powder, it is used like plumbago as a lubricator and to diminish friction, as well as to give a surface to some kinds of paper-hangings.

Sociable, a private carriage for town use, with two seats facing.

Society, an association or partnership. — In France a *société en commandite* is one where the manager is liable; a *société anonyme* is one without personal liability.

Society Islands, a group of islands in the Pacific Ocean, ceded to France in 1880. They lie between lat. 16° and 18° S., lon. 148° and 155° W.; area, 666 sq. m. The principal island is Tahiti, whose capital, Papiete, is much resorted to by American and other whalers. The exports consist of oranges, pearl-shell, arrow-root, cocoa-nut oil, etc.

The group is formed of 13 islands, which closely resemble each other in appearance. They are mountainous in the interior, with tracts of low-lying and extraordinarily fertile land occupying the shores all round from the base of the mountains to the sea. They are surrounded by coral reefs, are abundantly watered by streams, and enjoy a temperate and agreeable climate. Almost every tropical vegetable and fruit known is grown here. The inhabitants belong to the Malay race, are affable, ingenious, and hospitable. Pop. 18,000.

Sock, a short stocking; an inner warm sole for a shoe.

Socket, a hollow tube or receptacle for anything; the point in which a ball turns.

Socket-Chisel, a strong chisel used by carpenters for mortising.

Socque [Fr.], a wooden sandal.

Soda, an oxide of the metal *sodium*, not much used in the arts, for that which is popularly known by the name is really a *carbonate.* *Hydrate* of soda is the *caustic soda* used in soap-making. Sulphate of soda, or *Glauber's salt*, a residuum from certain chemical manufactures, is useful in medicine. Biborate of soda is the substance described under Borax. Chloride of sodium, formerly called muriate of soda, is the well-known and invaluable *common salt*, for which see Salt. *Carbonate of soda* comes for notice in the next article. As for the metal *sodium*, the basis of all these substances, it is highly prized by the scientific chemist for its very peculiar properties; but it is not yet much used in the arts in its metallic state. It is liberated in the metallic form by a mutual reaction between carbonate of soda, coal, and chalk, in a sodium furnace devised for the purpose. Several salts of soda are extensively imported. For the year 1879, our imports consisted of nitrate, 76,285,798 lbs., valued at $1,348,572, mostly from Peru; bicarbonate, 2,725,774 lbs., valued at $66,069, totally from England; carbonate (including sal-soda and soda-ash), 237,060,202 lbs., valued at $3,055,372; caustic soda,

45,774,916 lbs., valued at $1,187,625, mostly from England; and other salts, 2,455,212 lbs., valued at $25,990.

Manuf. — Carbonate of soda, an invaluable ingredient in soap, glass, and other manuf., is now made almost entirely of common salt, instead of being prepared from seaweed as formerly. See KELP. In Egypt, soda is made from a peculiar violet-colored water, which is left to evaporate. There results a crude carbonate of soda, contaminated with salt, sand, and sulphate of soda; it becomes much less impure, though still crude, by a refining process. In Hungary, soda forms in some places by natural efflorescence on the ground; the powder is scraped off, dissolved in water, evaporated to dryness, and heated to redness to destroy the organic matter; but the soda thus produced is still very impure. Common salt, we have said, is now the great source from which soda is prepared. Salt is *chloride of sodium*, and the first process is to convert this into *sulphate of soda*. Salt is put into a *decomposing furnace*, and about an equal weight of sulphuric acid is poured upon it. Hydrochloric acid gas results from the chemical action which goes on in the furnace; this gas is of some use in making muriatic acid and bleaching powder; but as there is more of it than can be profitably employed, much is let off through lofty chimneys into the atmosphere, where it sadly poisons the air. There remains in the furnace a pasty mass constituting crude sulphate of soda. This is removed to a furnace called the *roasting bed*, where, after being heated for some hours, it becomes a whitish mass called *salt-cake*. To convert this salt-cake into carbonate of soda, it is mixed with limestone and small coal in certain proportions, thrown into a reverberatory *black-ash furnace*, and exposed to heat and stirring; various gases are given off, and then the resulting mass becomes *black ash*, *ball soda*, or *British barilla*. This is made to yield about half its weight of *soda-ash* by steeping, evaporating, and calcining. The soda-ash or *white ash* resulting from these numerous processes is the soda so largely used in manufactures; it is really a carbonate of soda, not quite pure. It is purified for plate-glass making, and some other delicate purposes, by a further calcination; while the residue from this calcination is useful in making soap and crown glass. There are many variations in the details of these processes, but the general routine remains pretty constant. The deleterious gases which are given off from the chimneys, and the various compounds which accumulate as a refuse, are two of the blots at our soda-works: experiments are being constantly made to bring these substances into use, but as yet with only partial success. So largely is this important manufacture carried on, that some soda-works will use 500 tons of salt weekly. *Imp.* duty: The metal sodium, and all the salts of soda, n. o. p. f., 20 per cent; all the salts of soda, n. o. p. f., if medical preparations, 40 per cent.

Soda-Ash, the alkali obtained by the decomposition of sea-salt, which is first converted into sulphate of soda, and then into the dry white powder called soda-ash. It is used for soap-making, in glass making, and in other processes.

Soda, Caustic, a refined carbonate of soda, largely used for manufacturing purposes.

Soda Powders. These powders are usually put up in boxes containing 12 blue and 12 white papers, each paper of one color containing 30 grains of bicarbonate of soda, and each paper of the other color containing 25 grains of tartaric acid.

Soda-Water, a name loosely given to mineral waters, devised for special medical purposes, and the beverages, soda-water, seltzer water, etc.

"The most important constituent of all these waters is carbonic acid gas, which is prepared by decomposing carbonates of lime and bicarbonates of soda with acids, especially sulphuric acid, in a vessel called the generator. Carbonates of lime contain from 41 to 52 per cent of carbonic acid; bicarbonates of soda, 47.62 of soda and 52.38 of carbonic acid. Distilled water is used in making mineral waters, pure well or spring water for soda-water, etc. Water absorbs nearly its own volume of carbonic acid gas at 60° F., and the absorption is increased by reduction of temperature, increase of pressure, or both. The principal substances or salts used in the manufacture of mineral waters are comprised in the following groups: 1, chlorides of magnesium, calcium, strontium, and lithium, carbonate of lime and of magnesia, and sulphate of magnesia; 2, the alkaline salts; 3, the salts of iron and of manganese. Waters containing sulphuretted hydrogen gas can never be perfectly imitated, because the formation of this gas is a continual process of decomposition, originating from the reaction of organic matter upon the sulphates. In the construction of the manufacturing apparatus two different systems are followed: 1. The Geneva system, an improvement of Struve's original apparatus. In this the carbonic acid gas passes from the generator through purifying vessels or bottles containing partly water, partly certain solutions of salts, and thence into the gasometer, out of which it is pressed by a pump into the mixing cylinder, where the water is impregnated with it. Between the pump and the cylinder is placed the repurgator, a cylindrical tube of strong sheet copper containing fine charcoal, in which the gas undergoes a final purification. The water is then impregnated with the gas by revolving a paddling shaft which passes through the middle of the mixing cylinder. The latter is provided with a manometer which indicates the pressure of the gas, tubes through which the water enters, a safety-valve, and a water gauge. Bramah's apparatus is of similar construction, but has some improvements. In it the water to be aërated and the expanded carbonic acid gas are pumped in the proper proportions into the receiving vessel, where they are mixed and the aëration completed. This system is more generally in use in England and France than in Germany. 2. The self-generator system, after which the apparatus of Ozouf, Gappard, and Savaresse are constructed. It dispenses with the pump and gasometer, the water being impregnated by the pressure of the gas itself. The generator which contains the carbonates is filled with hot water to a certain height, and a square cooling apparatus is therefore applied between the washing vessels and the cylinder. This apparatus is not so expensive as the former, but is less recommended on account of the imperfect purification of the gas and its liability to explosion. The apparatus of Mr. John Matthews of New York, which is now widely introduced in Europe, is a combination of the Bramah and the self-generator systems, the mechanical devices of the former being greatly simplified, and the liability to explosion of the latter being obviated by a safety cap. After the mineral water is made it is drawn from the apparatus into fountains (portable cylinders), siphons, or bottles, the faucets and filling and corking apparatus being so constructed as to prevent the loss of carbonic acid. For use, the fountains, which resemble the mixing cylinder in construction, are placed as reservoirs under or behind the marble case on the counter. The case contains ice in the cooling chamber, through which the connecting pipes from the fountains pass to the faucets in front. The business of furnishing aërated waters in portable fountains has greatly increased since the improvements made by Matthews in the apparatus. The fountains previously in use were superficially coated with a wash of tin, and the contents were sooner or later contaminated by poisonous metallic salts. The Matthews fountains are composed of an inner container of pure sheet tin secured in a shell of fine cast steel. Although much lighter than the old style of fountains, the 15-gallon fountain weighing but 40 lbs., they will resist a pressure of 500 lbs. to the square inch; and the connections being made of solid tin encased in sustaining sheets, the water cannot be contaminated. There are now 10,000 of these fountains in use, furnishing 4,000 places for dispensing aërated waters. The most perfect and elegant dispensing apparatus, in which the sirups are contained in portable glass tanks where they do not come into contact with any metal, are now made in the U. States and extensively exported to Europe. See Fig. 204. An important and novel improvement in bottling aërated beverages, an American invention, in which the bottle is closed from the inside by a glass stopper, has recently come into extensive use both in the U. States and in Europe. — Soda-water proper is a solution of carbonate of soda in water, impregnated with carbonic acid gas. Webb's English soda-water contains 15 grains of crystallized carbonate of soda in one pint of water. Chloride of sodium is frequently added. Bicarbonate of soda is sometimes used for generating carbonic acid gas, and from this has arisen the popular use of the name soda-water for carbonic acid water, or water charged with an excess of carbonic acid. German and American soda-water, or what is called in France *eau de seltz*, contains no soda. Priestley first produced it by pouring dilute sulphuric acid over carbonate of lime, and impregnating the water with the gas, a method which is still generally followed. Under the name of soda, carbonic acid water is mixed with sirups, and it forms a constituent of many of the Ameri-

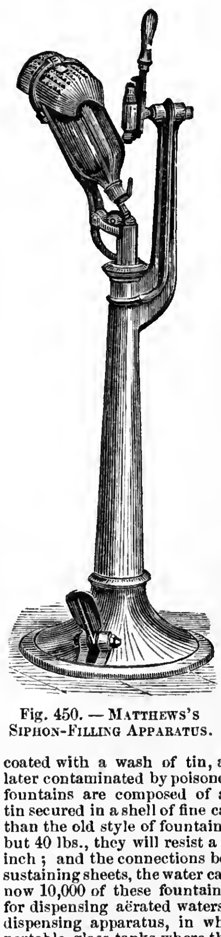

Fig. 450. — MATTHEWS'S SIPHON-FILLING APPARATUS.

can compound drinks. In Paris it is taken as *eau gazeuse* with hock and clarets. Carbonic acid water improves the taste and increases the sanitary effect of drinks, is the best antidote for alcohol, and lessens the desire for spirituous liquors. It has a generally exhilarating and invigorating effect upon the system, essentially promotes digestion, checks too great acidity in the stomach, and is a much esteemed remedy in febrile diseases." — *The American Cyclopædia.* — In Matthews's apparatus the bottle is placed in the holder at the head of the machine, and enclosed by a rocking screen to protect the operator in case of explosion of the siphon. By pressure on the treadle, the bottle is elevated, the spout of the siphon is inserted into the filling-head, and the siphon lever is pressed so as to open the siphon-valve; the lever of the filling-head is then drawn toward the operator, causing the aërated water to fill the bottle. By reversing the movement of this lever the aërated liquid is shut off, and a vent-valve opened, by which some of the gas compressed above the liquid in the bottle is allowed to escape, so that more of the aërated liquid may enter the bottle when the liquid-valve is opened.

Soft Cement. See CEMENT (CHEMICAL).

Sok, a Siamese measure of length. See SIAM.

Solder, SOLDERING. A *solder* is a metal which, when melted, acts as a cement between two pieces of unmelted metal. There is a great variety of them, known by the names of *hard, soft, spelter, silver, white, button, gold, copper, tin, plumber's, pewterer's,* and many others. Nearly all the principal metals take part in the composition of solders, and most unmelted metals can be jointed or cemented by one or other of these solders. In all cases the solder is more fusible than the metal to be united. The most frequently employed solder consists of tin and lead, and melts somewhere between 330° and 560° F., according to the proportions of the ingredients. Many variations occur in the mode of conducting the operations. The edges of the two metals must be well cleaned, and then heated; the solder must be melted; a flux of borax, etc., is often needed to insure the adhesion of the solder to the two pieces of metal, and soldering irons of various kinds are required. The name of *autogenous* soldering is given to a process wherein neither solder nor flux is used. A mode of *burning* the edges of the metal together is adopted by the aid of intense heat.

Sole, the bottom part of a shoe or boot, or the piece of leather which constitutes the bottom. — A support or rest for a draining-tile. — A plate of iron attached to that part of the plough which runs on the ground. — An esteemed flat fish, *Solea vulgaris,* caught off the British coasts in great abundance. The New York sole, *Achirus mollis,* found from Nantucket to South Carolina, is 6 to 8 in. long, dark brown, marked transversely with irregular black bands, and has small scales. — A Peruvian money. See PERU.

Sole-Leather, thick ox-hide or shoe butts, suitable for soles of shoes and boots.

Solograph, a name which has been given to some pictures on paper, taken by the talbotype or calotype process.

Solvent, able to pay all debts contracted.

Sombrero [Sp.], a hat.

Sommier, a horse-hair mattress.

Son, the French name for bran; the husks of ground corn.

Sonchy, another name for Cape tea.

Sonometer, an instrument for testing the efficacy of treatment in deafness, consisting of a small bell fixed on a table.

Soorma, a sulphuret of antimony, with which Indian women anoint the eyelids.

Soot, condensed smoke, collected by chimney-sweepers and sold for manure.

Soovarnuka, an Eastern name for cassia-fistula pods.

Sorbine, a saccharine matter obtained from the berries of the mountain-ash (*Sorbus acuparia*).

Sorghum, SORGHO, CHINESE SUGAR-CANE, a grass, the *Sorghum vulgare,* variety *Saccharatum,* a sugar grass, first introduced into the U. States in 1857, and is extensively cultivated in some of the Southern and Western States, though perhaps not so much as it would deserve to be. *S.* grows from 8 to 10 ft. high, and before the seed cluster shows, has much the appearance of maize. Its stalks abound in saccharine juice, which is expressed by mills, wrought either by steam, water, or horse-power.

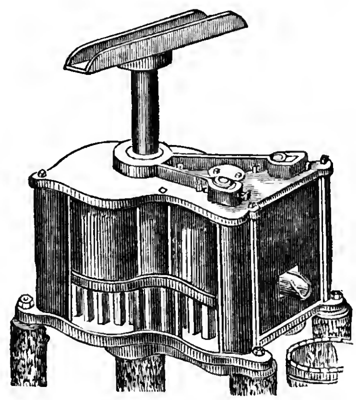

Fig. 451. — SORGHUM MILL.

As a fodder, *S.* is now regarded as less valuable than maize. The seeds are fed to poultry, cattle, and hogs, and bread has been made from the flour. The begum, or refuse from the press, has been used to make the coarser kinds of wrapping paper; and the scum and washings of the evaporations are converted into vinegar. *S.* sugar, when newly pressed, much resembles glucose; its crystallization is difficult, and its extraction is therefore unprofitable, at least in this country. The plant is chiefly cultivated for the sirup or molasses, which varies, according to the care given to its manufacture, from a greenish-brown color with a repulsive, grassy flavor, to a fine amber-colored, honey-like fluid, which, having no characteristic flavor, is preferred by many to any other sirup. The evaporators now in use allow the juice to be concentrated without undue exposure to heat, while the scum is readily removed; lime is used in correcting the acidity of the juice, which for the finest product is filtered through animal charcoal. The statistics of production of *S.* molasses in the U. States for several years are given under MOLASSES (page 750). The sugar of *S.* is a small item, yet in 14 years, in Ohio alone, it amounted to 506,000 lbs. Including sugar, forage, etc., the annual value of *S.* must be about $8,000,000.

Sorrel, a horse of a reddish color. — A name for two plants, one the wood sorrel, *Oxalis acetosella,* the leaves of which, being acid and refrigerant, are used in salads and as an infusion in fevers; the other, the *Rumex acetosa,* possesses similar properties, and is also used as a pot-herb and salad, and in cooling drinks.

Sorted, classed, arranged, put in order, or into separate parcels according to qualities or sizes.

Sorts, varieties; a mixture of printing-type.

Sound, a long and slender instrument which surgeons introduce into the bladder, in order to discover whether there is a stone there or not. — The air-bladder of a fish. Many of them are eaten, especially cods' sounds, fresh or salted; others furnish isinglass. — A narrow strait of water where vessels lie at anchor. — To ascertain the depth of water with a plummet and line.

Sounding-Board, a board over a pulpit, to make the speaker's voice heard at a distance. — A board for propagating sound in a musical instrument.

Sounding-Line, a line attached to a leaden plummet for determining the depth of water in a ship's hold.

Sounding-Rod, an iron rod marked with inches and feet, to ascertain the depth of water in a ship's hold.

Soundings, the act of throwing the lead to find depth of water, or a bottom. — Any particular place of the ocean, or depth of water where a plummet will reach the bottom.

Soup-Ladle, a spoon with a large bowl and long handle, for dipping out soup.

Sour, acid; possessing a pungent taste; sharp to the palate; as sour apple, sour cider. — Rancid; musty, fusty; turned or coagulated; as, sour milk, sour molasses, sour flour.

Souse, to dip or steep. — To pickle fish in vinegar, and bake them.

Soutache, a narrow worsted or silk braid.

Southampton. See GREAT BRITAIN.

South Australia, a British colony in Australia, whose name has become a misnomer, its boundaries having been extended so as to include the entire centre of the continent from N. to S. Thus it extends from lat. 11° to 38° S., and from lon. 129° to 141° E., comprising an area of 904,133 sq. m., with a pop. of 225,677 (exclusive of about 3,000 aborigines). It was first settled in 1836. The settled portion is essentially an agricultural and pastoral province, its breadstuffs and wool constituting nearly three fourths of its exports. In 1877 the extent of land under cultivation was 1,828,115 acres; the value of native-grown wool exported was $9,181,495; of breadstuffs, $9,944,580; and of copper, $2,509,950. Vine-culture is becoming a fast-increasing branch of industry, 493,000 galls. of wine having been made in 1877.

Adelaide, the capital of South Australia, situated on the Torrens, 7 m. from Port Adelaide, with which it is connected by railroad. The principal manuf. are woollen, starch, soap, beer, flour, leather, earthenware, and iron goods. There is a good retail trade in European produce; and in the vicinity are iron and copper mines; pop. 32,415. — *Port Adelaide* is situated in a low, marshy position, on a small inlet of the Gulf of St. Vincent. Its harbor is safe and commodious; but a bar at the mouth, where the depth varies with the tide from 8 to 26 feet, prevents large vessels from entering. It is a free port, and has good wharfs and warehouse accommodations. Pop. 2,482.

South Carolina, a S. E. State of the American Union, situated between lat. 32° 2′ and 35° 10′ N., lon. 78° 24′ and 83° 30′ W. It is bounded E. by the Atlantic Ocean, N. and W. by North Carolina, and S. by Georgia. Its greatest length, E. and W., is 275 m.; greatest breadth, N. and S., 210 m.; area, 30,213 sq. m. It is divided into 32 counties. *Columbia*, its capital, is situated on the Congaree, which is navigable to this point, 100 m. N. W. of Charleston; pop. 10,000. The largest city and commercial emporium is Charleston. See CHARLESTON. Pop. in 1880 about 925,000.

The coast of *S. C.* for about 100 m. inward is flat and sandy, with a light soil, covered with pitch-pine forests, traversed by sluggish streams, and interspersed with numerous swamps. This portion of the State is of alluvial formation. Beyond this plain is a belt of low sand hills, called the *middle country*, which is moderately productive. West of the middle country is a belt called the *ridge*, where the land rises abruptly, and thence continues to ascend, exhibiting beautiful alternations of hill and dale, till it terminates, at the extreme N. W. part of the State, in the Blue Ridge, the highest peak of which, in *S. C.*, is Table Mountain, 4,000 ft. above the sea. King's Mountain, in York district, is an isolated mountain of considerable prominence. The coast line of *S. C.* extends from Little River Inlet, in a S. W. direction, to the mouth of the Savannah River, about 200 m., presenting numerous inlets, bays, shallow sounds, and lagoons, and a few good harbors. A number of small islands skirt the S. coast of the State, which are shut off from the mainland by narrow channels, which afford inland steamboat communication between Charleston and Savannah. These islands are low and flat, and produce the Black-seed, or *Sea-island cotton*. See COTTON. The principal rivers are: the Savannah, which bounds the State on the S., and for nearly 300 m. marks its line; the Broad River and Pocotaligo, which empty into the bay of Port Royal; the Combahee, Ashepoo, and Edisto, which empty into the bay of St. Helena, and are bordered with rich rice and cotton plantations; the Stono, which is in the immediate vicinity of Charleston, and the Ashley and Cooper, on which old Charleston is situated; the Santee, which, through its connection with the Congaree and Wateree, runs through the heart of the State up to the mountains; and the Pedee, which receives the Waccamaw of N. Carolina into its bosom, and empties into the bay of Winyaw. — Favorably situated between the intense heat of the tropics and the frigid temperature of the North, *S. C.* enjoys the climate of the S. of France and of Italy; and while the State grows the cotton, rice, tobacco, and even the tea of the Southern plantations, it also produces wheat, rye, oats, barley, and every other product of the most northerly farm. The mean temperature at Charleston is about 65° 5′; and the mortality in the State is 1 death in 71 inhabitants, while in the District of Columbia, for instance, there is 1 in 58 inhabitants, and in Prussia 1 in 36. — The soil of *S. C.* is diversified. On the uplands, it is clay, loam, sand, or a mixture of all; and in the lowlands and bottoms, an alluvial of more or less value. The larger river bottoms are exceedingly rich, and especially in the tidal region. There are no barrens. — The gold-bearing rocks of the Atlantic slope extend through the S. portion of *S. C.*, where the precious metal has been found in sufficient abundance to reward the labor of the miner. Iron of a very superior quality, copper, lead, manganese, bismuth, plumbago, soapstone, coal, black-lead, oxide of titanium, sulphuret of iron, and limestone are found in divers districts. Granite of the finest grain and uniform appearance, equal to gray marble, is frequent in the upper and middle districts. Materials for pottery, porcelain clay, arenaceous quartz, and pure sand for glass, are also found in many sections of the State. Mineral springs exist in Spartanburg, Greenville, Abbeville, and Laurens districts. — The usual productions of the State are cotton, the long and short staple, rice, both swamp and upland, tobacco, indigo, sugar, wheat, rye, corn, oats, millet, barley, buckwheat, pease, beans, sorghum, broom-corn, sunflower, guinea-corn, sweet potatoes, and white potatoes. Hemp, flax, and hops grow as in their native countries. The grape grows luxuriantly in every portion of the State; and enormous vines are found in woods and swamps, extending to the topmost branches of the tallest forest trees. The silk-worm thrives well, and the *Morus alba* (*multicaulis*) flourishes without any more care or attention than any other forest tree, and its growth is so rapid that the leaves can be used the second year after planting. The tea-plant is successfully cultivated. The amount and value of agricultural products and live-stock for the year 1879 are given in this work under the names of each of the principal crops and animals. — The number of farms in the State, as reported by the last census, was 51,887. The total number of acres of land in farms was 12,105,280; of which 3,010,539 consisted of improved lands, 6,443,851 of woodland, and 2,650,890 of other unimproved soil; the cash value of farms under cultivation, $44,808,763, exclusive of $2,282,946 of implements and machinery; amount of wages paid for husbandry during the year, $7,404,297; total value of farm products, $41,909,402; of orchard stuffs, $47,960; of market-gardens, $127,459; of lumber, etc., $167,253. The total number of manufacturing establishments was 1,584, having 210 steam-engines of 4,537 horse-power, and 700 water-wheels of 10 395 horse-power; and employing 8,141 hands, of which 7,099 were males above 16, 578 females above 15, and 464 youth. The capital invested in manuf. amounted to $5,400,418; wages paid during the year, $1,543,715; value of materials used, $5,855.736; of products, $9,858,981. In 1879 there were in *S. C.* 12 national banks in operation, with a capital stock of $2,851,100. The public debt of the State, funded under act of Dec. 22, 1873, was $5,130,965, and fundable, $1,406,729; total, $6,537,695. Interest remaining unpaid Nov. 1, 1878, $652.424. The State has assets as follows: Railroad shares, $2,290,700: Bank of South Carolina, per capital and sinking fund, $4,263,947; etc. The assessed value of taxable property was: Real estate, $90,270,998; personal property, $35,836,864; and railroad property, $6,520,772; total, $132,628,634. Tax per capita, $0.70. — In 1879, the State had 1,419 m. of railroad belonging to 16 companies, named in the following table: —

Fig. 452.
SEAL OF SOUTH CAROLINA.

Companies.	Total length of line.	Total length of line in the State.
Ashley River R.R.	3.75	3.75
Atlanta and Charlotte Air-Line	269.00	129.50
Blue Ridge	43.43	43.43
Charlotte, Columbia, and Augusta	195.00	184.50
Cheraw and Chester	17.50	17.50
Cheraw and Darlington	40.00	40.00
Chester and Lenoir	52.00	35.00
Greenville and Columbia	164.80	164.80
Laurens	32.00	32.00
North-eastern	102.00	102.00
Port Royal and Augusta	112.00	112.00
Savannah and Charleston	106.00	90.50
Ashley River Branch	5.25	5.25
South Carolina	243.00	243.00
Spartanburg and Asheville	48.00	21.00
Spartanburg, Union, and Columbia	69.00	69.00
Wilmington, Columbia, and Augusta	189.00	125.50

S. C. has three U. States customs districts; Charleston, which engrosses the bulk of the commerce of the State, and the two following: —

Beaufort, a port of entry, on Port Royal or Beaufort Island, and on an inlet called Port Royal River, about 14 m. from the sea, and 55 m. W. S. W. of Charleston. It has a good harbor, accessible to vessels drawing 15 ft. of water. Cotton, phosphate of lime, and lumber, are the chief articles of export. 21 vessels belong to the port, tonnage 807. In 1879, 170 vessels, of 72,885 tons, entered, and 165, of 70,764 tons, cleared, in the foreign trade; 20 vessels, of 5,596 tons, entered, and 3, of 116 tons, cleared, in the coastwise trade. The value of imports from foreign countries was $5,053; of exports, $1,091,305. Pop. of township, 6,000.

Georgetown, a port of entry on Winyaw Bay, at the mouth of the Waccamaw River, about 14 m. from the sea and 50 m. N. E. of Charleston. The port has 23 vessels, of 1,908 tons in aggregate. In 1879, 5 vessels, of 1,113 tons, entered, and 14, of 2,982 tons, cleared, in the foreign trade; 37 vessels, of 11,864 tons, entered, in the coastwise trade. The value of imports from foreign countries was $13,584; of exports, $34,601. Pop. of township, 4,000.

South Carolina R.R. runs from Charleston to Hamburg, S. C., 137 m.; branches, from Branchville to Columbia, 68 m., and from Kingville to Camden, 38 m.; total length of line, 243 m. This Co., located in Charleston, was chartered in 1827, and the main road opened in 1833. The property was placed in the hands of a receiver in Sept. 1878, at the suit of the second bondholders. Cap. stock, $5,819,275; sterling bonds, $1,482,666; domestic bonds, $3,349,812; floating debt, $1,414,036.

Southern Central Railway runs from Fairhaven, N. Y., to State line of Penn., 114 m. This Co., located at Auburn, N. Y., was chartered in 1865, and the road opened in 1871. Cap. stock, $1,790,234; funded debt, $2,540,125. Per contra: cost of road and equipment, $3,661,153; real estate, $625,857.

Southern Minnesota R.R. runs from Grand Crossing to Winnebago City, Minn., 167.5 m. The Southern Minnesota R.R. Co. was organized in 1855; sold under foreclosure of the 2d mortgage in Feb. 1877, and reorganized under its present title. Cap. stock authorized, $1,984,200; funded debt, $4,639,-900. Total stock and bonds, representing cost of road to reorganized Co., $6,424,100. The principal office of the Co. is at La Crosse, Wis.

Southern Pacific R.R. See this heading in the Appendix.

South-Western R.R. runs from Macon, Ga. to Eufaula, Ala., 144 m.; branches, 166.5 m. This Co., located at Macon, Ga., was organized in 1868, and leased in 1869 to the Central R.R. of Georgia, the lessees assuming all liabilities and agreeing to pay 7 % on the cap. stock as a minimum. The lease provides for the ultimate consolidation of the two companies. Cap. stock, $3,892,300, and 7 % convertible bonds, $399,000; total stock and bonds, representing cost of property, $4,291,300.

Sovereign, the principal English gold coin, weighing 5 dwt. and 3.274 grains. Its value is 20 shillings sterling, or $4.84.

Sow, an ingot or mass of metal.

Soy, a sauce or flavoring originally made in the East, and said to be produced from a species of doliches bean, *Soja hispida.*

Spa, a mineral spring.

Space, area; room. — A small piece of cast metal to divide letters or words in printing.

Spade, a digging-tool of iron with a wooden handle.

Spain [Sp. *España*], a kingdom of Southern Europe, lying between lat. 36° 5′ and 43° 30′ N., and lon. 3° 20′ and 9° 10′ E., having on the W. Portugal and the Atlantic, and S. and E. the Straits of Gibraltar and the Mediterranean. Greatest length, E. to W., about 650 m.; greatest breadth, 550 m.; area, 182.758 sq. m. The 12 ancient divisions of the kingdom, inclusive of the adjacent islands, are divided into 49 provinces, as follows: 1. *New Castile:* Madrid, Guadalaxara, Toledo, Cuença, Ciudad Real; 2. *Old Castile:* Burgos, Logroño, Santander, Oviedo, Soria, Segovia, Avila, Leon, Palencia, Valladolid, Salamanca, Zamora; 3. *Galicia:* Corunna, Lugo, Orense, Pontevedra; 4. *Estremadura:* Badajoz, Caçeres; 5. *Andalusia:* Seville, Huelva, Cadiz, Jaen, Cordova; 6. *Granada:* Granada, Almeria, Malaga; 7. *Valencia:* Valencia, Alicante, Castellon-de-la-Plaña, Murcia, Albacete; 8. *Catalonia:* Barcelona, Tarragona, Lerida, Gerona; 9. *Aragon:* Zaragoza, Huesca, Teruel; 10. *Navarre:* Navarre; 11. *Guipuzcoa:* Alava, Biscay, Guipuzcoa; 12. *Islands:* The Balearic and Canary Islands. *Madrid,* the capital of *S.*, is an inland city, in New Castile, on the Manzanares, lat. 40° 25′ N., lon. 3° 45′ W., 2,450 feet above sea-level. The government is a constitutional monarchy. The executive rests in the king, and the power to make the laws in the Cortes with the king. The Cortes are composed of a Senate and Congress, equal in authority. Pop. 16,635,506.

Subjoined is the pop. of the principal towns of *S.* in 1879, according to official estimates: —

Towns.	Population.	Towns.	Population.
Madrid	367,284	Murcia	82,620
Barcelona	215,965	Saragossa	67,539
Valencia	153,457	Granada	60,500
Sevilla	118,878	Cadiz	57,020
Malaga	97,943	Valladolid	44,871

Spanish Colonies. — The principal are Cuba, Puerto Rico, and some smaller islands in America; the Philippine, Caroline, and Mariana Islands in the Pacific, the Canary Islands in the Atlantic, Fernando Po and the island of Annabon in the Gulf of Guinea, and Ceuta, Gomera, and Melilla in Barbary. Their total area is 117,209 sq. m.; total pop. 8,093,610.

S., next to Switzerland, is the most mountainous country in Europe. The lofty Pyrenees forming its N. E. barrier are continued through the N , where they received the name of the Cantabrian chain, running parallel to the Bay of Biscay, and terminating in Cape Finisterre. The remainder of the country may be considered generally as a series of mountain-terraces, which, projecting successively their rugged edges towards the S., present a flight of gigantic steps from the Pyrenean range to the Mediterranean. But the central portion, comprising the greater part of the provinces of Old Castile, New Castile, Leon, and Estremadura, is an elevated table-land, averaging from 2,000 to 3,000 feet above the level of the sea. The singular configuration of *S.* renders its climate various. In the low grounds, the heat during summer is excessive; in the elevated regions the temperature is cooler, and the interior is subject to piercing winds, which prevent the production of many fruits that thrive in the more northern latitudes of

Italy. — The chief rivers of *S.* are the Ebro, Douro, Tagus, Guadalquivir, and Guadiana, some of which run several hundred miles, but owing to the aridity of the table-land and the adjoining tracts, in which they almost all rise, they contain little water; they are besides impeded by rocks, shallows, and cataracts; and only a very few are navigable for small boats, and that commonly near their mouths. But though nearly useless for the purpose of inland communication, they are of importance for the irrigation of the ground, — a practice nearly general in the countries bordering the Mediterranean, and in the basin of the Guadalquivir. In the table-lands, irrigation cannot be introduced, owing to the depth of the river courses; and in the N. and N. W. maritime provinces it is unnecessary, from the abundance of the rains. — The soil is in general fertile, especially where irrigation has been employed; and the vales on the E. coast are remarkable for their perpetual succession of crops. But agriculture, except in Biscay, Navarre, and Aragon, and in the *huertas*, or irrigated lands of Granada, Murcia, and Valencia, is in the most backward state imaginable. The most common kinds of grain are wheat, maize, barley, and rice; the wheat is raised chiefly in Catalonia, Old Castile, and Leon; and the rice in the N. E. provinces. Hemp and flax are cultivated principally in the basin of the Ebro; madder and saffron on the table-land of Cuença, and the sugar-cane and cotton in the S. districts. The usual products of southern latitudes, namely, olives, figs, vines, oranges, and lemons, also abound; and to these have to be added barilla, silk, honey, licorice juice, cork, and esparto, or sedge. The Pyrenees, Asturian Mountains, and the Sierra Morena possess luxuriant forests; but, on the whole, *S.* has less timber than any other extensive country of Europe. — Of domestic animals, the most important are sheep, especially the merinos or fine-woolled breeds, which pass the winter in the plains of Andalusia, Castile, Leon, and Estremadura, and remove in summer to the nearest mountains, chiefly the Sierras de Guadarama, Avila, and Gata. This migrating system, which originates in the physical state of the country, is an important part of the rural economy of *S.*, and is governed by peculiar and in many respects oppressive customs and laws. The number of sheep is estimated at nearly 14,000,000. Goats also are numerous; and the asses and mules are distinguished for their size and beauty. *S.* was formerly celebrated for her horses, especially those of Andalusia; but few of the finer breeds now remain. — Minerals abound, but the only mines extensively worked are those of quicksilver at Almaden; of lead in Granada; and of iron in the Sierra de Aralar. Salt is procured at Cardona, in Catalonia, from the Albufera de Valencia, and from the sea water on the coast of Seville. — *Manuf.* Catalonia, Biscay, and Valencia are the most industrious provinces, and in them manuf are most advanced. Those of silk and cotton, especially the first, are carried on to a considerable extent in Barcelona, Valencia, and other towns; but, though the fabrics be excellent, the colors are wretched. The blondes mantillas of Almagro, in La Mancha, are perhaps the best of the Spanish manufactured articles. Broadcloth is made at Alcoy, in Valencia, and coarse cloths (*pano pardo*) are extensively manufactured in Catalonia, and in various districts throughout the country. But, with the exception of silks, all the woven fabrics produced in *S.*, whether woollens, cottons, or linens, are at once badly finished and enormously dear; even the coarse, hard-spun *mantas*, that serve the muleteers for cloaks and blankets, bring exorbitant prices.

Commerce. — The great articles of export from *S.* are wine, olive-oil, wool, fruit of various kinds, lead, quicksilver, brandy, cork-wood, salt, raw silk, and wheat. The most important articles of import are colonial products, obtained principally from Cuba; cotton and cotton-wool, linens, hemp and flax, woollens, salted-fish, hardware, glass and earthenware, timber, rice, hide, leather, and cheese. Among the importing countries, France stands first, and Great Britain second; but in exports, the latter holds the first rank. The imports and exports for the year 1875 were as follows: —

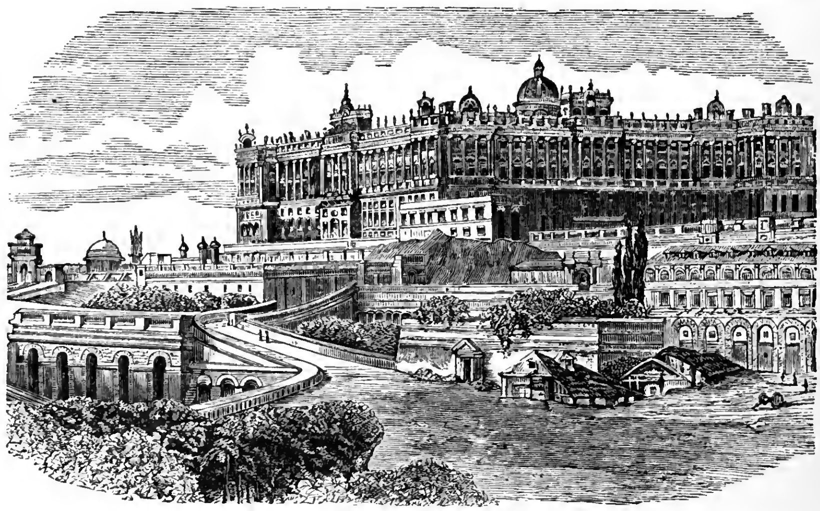

Fig. 453. — The Royal Palace (Madrid).

Articles.	Imports.	Exports.
	pesetas.	pesetas.
Grain	4,800,000	18,500,000
Beverages	5,200,000	152,500,000
Colonial goods	25,900,000	7,000,000
Seeds and fruits	....	35,000,000
Animals and animal provisions	21,000,000	8,900,000
1. Articles of food	56,900,000	221,900,000
Coal	18,200,000	....
Ores and minerals	....	36,200,000
Raw metals	11,700,000	49,900,000
Hides and leather	23,600,000	....
Spinning material	85,500,000	8,100,000
Esparto	....	10,000,000
Wood and cork	23,800,000	700,000
2. Raw materials	162,800,000	104,900,000
Glass and pottery ware	1,400,000	....
Metallic goods	14,100,000	700,000
Machines	22,100,000	....
Yarns	26,400,000	....
Woven goods	23,800,000	....
Furniture	1,600,000	....
Corks	....	10,000,000
Paper and playing cards	2,400,000	3,000,000
3. Manufactured goods	91,800,000	13,700,000
Drugs, etc	9,600,000	....
Salt	....	6,500,000
Resin, fats, and oils	12,400,000	31,200,000
4. Miscellaneous	22,000,000	37,700,000
Total	333,500,000 $66,700,000	378,200,000 $75,640,000

The commercial intercourse of *S.* with the U. States for 14 years, from 1866 to 1879, was as follows:—

Year.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
	$	$	$	$
1866....	5,718,746	....	2,673,108	8,391,854
1867....	5,506,749	59,547	3,050,812	8,617,108
1868 ...	7,627,552	23,011	2,878,007	10.528,570
1869....	7,596,294	4,885	3,558,388	11,159,567
1870....	9,749,545	32,858	3,638,345	13,420,748
1871....	10,248,320	3,566	4,188,445	14.440,331
1872....	9,445,705	20,861	4,426,165	13,892,731
1873....	10,056,724	16,909	4,962,431	15,036,064
1874....	11,643,715	9,423	4,598,204	16,251,342
1875....	7,540,086	27,290	4,534,666	12,102,042
1876....	10,138.320	9,400	3,399,863	13 547,583
1877....	10,461,750	11,726	3,280,836	13,754,312
1878....	8,200,840	4,626	3,265,646	11,471,112
1879....	12,438,903	86,426	3,334,241	15,859,570
Total..	126,373,249	310,528	51,789,157	178,472,934

For the year 1879, the principal articles imported from and exported to the U. States were as follows: *Imports*, Indian corn, $207,194; wheat, $2,014,294; wheat flour, $210,967; raw cotton, $7,194,162; drugs, chemicals, $19,568; mineral oil, $747,089; cotton-seed oil, $26,934; bacon and hams, $132,986; lard, $22,934; spirits from grain, $449,109; tallow, $152,321; tobacco (leaf), $496,469; shooks, staves, etc., $509,562. *Exports*, chemicals, drugs, etc., $148,412; cork, $173,040; fruits, $2,351,664; lead, $13,048; salt, $39,003; straw and palm-leaf, $43,648; wine, $296,370.

The merchant navy of the kingdom consisted, in 1878, of 2,915 vessels of a total burden of 557,320 tons, comprising 230 steamers, of 176,250 tons.—The length of railroads in 1878 was 5,857 kilometros, or 3,673 m.; and 2,000 kilometros, or 1,264 m., were in course of construction. The whole of the Spanish railroads belong to private companies, but nearly all have obtained guarantees, or subventions, from the government. All the principal lines have been conceded to private individuals, or companies, with large subventions. The concessions, when a "subvention" is attached to them, are given by public adjudication. Any one who has made the stipulated deposit of "caution money" may apply for a concession in sealed tenders, which are opened and read in public on the day of adjudication, and whoever offers to make the railway with the lowest subvention becomes legally entitled to the concession.

Finances.—The revenue of the kingdom, which is about $150,000,000, is raised by a system of direct and indirect taxation, stamp duties, government monopolies, and income from state property. The direct taxes are imposed on landed property, houses, live-stock, industry, commerce, registration acts, titles of nobility, mortgages, and mineral produce. The indirect taxes are derived from foreign imports, articles of consumption, tolls, bridge and ferry dues. There have been no accounts of the actual public revenue and expenditures published since the year 1871, but only budget estimates, which differ to such an extent as to allow not even an approximate judgment of the real receipts and expenditures. The constant and ever-increasing excess of government expenditure over public revenue has created a national debt of very large amount. According to a report published by the government in 1876, the debt and its annual interest were as follows on June 30, 1875: Capital, 40,975,987,697 reals, or $2,048,799,380; interest, 1,056,252,927 reals, or $52,812,645. According to a semi-official statement, the national debt had risen in 1878 to 55,000,000,000 reals, or $2,750,000,000. Since the commencement of the year 1872, the wants of the government have been supplied mainly by temporary loans, raised at very high rates, and the nominal amount of which served to swell the national liabilities to its present enormous dimensions. In 1851, on account of the inability of the government to meet its engagements in full, a portion of the debt of *S.* was converted into passive stock, that is, a stock not bearing interest, and which was to be liquidated by an annual sinking fund. The law closed the London market, and subsequently that of Paris, against Spanish loans. It was admitted by successive ministers of finance in recent years, that *S.* was absolutely unable to pay interest on its debt in the existing state of things, ruined both by a costly and wasteful civil war, and desperate and equally costly efforts to suppress the insurrection in Cuba. In a report of the government of King Alfonso XII., dated July, 1875, it was stated that not any of the national creditors could hope to be satisfied "without having recourse to credit operations at an enormous rate of interest, which in a short time doubles the original debt."

MONEY.

The *Real* = 100 *Centimes* = Av. rate of exchange, 4 = $0.193
" *Peseta* = 4 *Reales* = " " " 5 = 0.965
" *Escudo* = 10 *Reales.*

WEIGHTS AND MEASURES.

Since Jan. 1, 1859, the French metric system of weights and measures has been introduced in *S.*, with no other change than a slight one of names, the mètre becoming the metro, the litre the litro, the gramme the gramo, and the are the area. But, beside these, the old weights and measures are still largely used. They are:—

The *Quintal* . . .	=	101.4 pounds avoirdupois.
" *Libra* . . .	=	1.014 " "
" *Arroba* for wine .	=	$3\frac{1}{2}$ gallons.
" *Arroba* " oil . .	=	$2\frac{3}{4}$ "
" *Square Vara* . .	=	1.09 Vara = 1 yard.
" *Fanega* . . .	=	$1\frac{1}{2}$ bushel.

The principal ports of *S.* are here given in their alphabetical order:—

Alicante ranks in importance after Cadiz and Barcelona. It is situated at the head of the bay of Alicante, in the Mediterranean Sea, in lat. 38° 20′ N., lon. 0° 30′ W. There is a good anchoring-ground in the bay, but only the smaller vessels can come up to the pier or mole. There is a fixed light on the mole, 95 ft. high, and visible for a distance of 15 m. The chief exports are esparto, raisins, almonds, oranges, olive-oil, silk, saffron, wine, lead, salt, and soda. Pop. 31,500.

Barcelona, formerly the capital of the kingdom of Catalonia, a flourishing city on the Mediterranean, in lat. 41° 22′ N., lon. 2° 9′ E. It stands on the sloping edge of a small but fertile plain, now covered with villas and gardens. Immediately to the S. E. rise the Montjerich Hills to the height of 650 ft., crowned by an important fortification. Down to a very recent period, the harbor, formed by a mole or jetty, was shut off from the open sea by a sand-bank, which rendered the entrance of large vessels impossible. An extension of the former mole, and the construction of another, from the foot of Montjerich, have embraced a portion of the sea outside of the bank, and a convenient shelter is thus afforded for the heaviest men-of-war. The depth in this part is about 40 ft., while within the sand-bank it is from 18 to 20. Barcelona has important manufactories of wool, cotton, silk, etc., and it carries on a large shipping trade. Its imports from the European and American ports are very considerable; its exports much less, consisting largely of fruits, vegetables, oil, silk, salt, etc. Pop. 215,965.

Bilbao, an important city, and capital of the prov. to which it gives its name, is situated in lat. 43° 14′ N., lon. 2° 56′ W., about 6 m. from the Bay of Biscay, on the banks of the river Nerva. Large sums of money have been spent in improving the river, but ships of any size have to discharge at Portugalete, the average depth on the bar being 13½ ft. at high tides. In spite of this disadvantage, however, Bilbao ranks as one of the principal trading ports of *S.* Pop. 18,000.

Cadiz, the principal commercial city and seaport of *S.* on its S.W. coast, on the rocky and elevated extremity of a narrow, low peninsula, or tongue of land, projecting from the Isla de Leon, N. N.W. about 4½ nautical m. It is surrounded on all sides, except the S.,—where it joins the land,—by the sea, and is very strongly fortified. It is well built, and has at a distance a very striking appearance. The tower or light-house of St. Sebastian, stands on the W. side of the city, being in lat. 36° 31′ 7″ N., lon. 6° 18′ 52″ W. It is a most conspicuous object to vessels approaching from the Atlantic. The light, which is 172 ft. high, is of great brilliancy, revolves once a minute, and in fair weather may be seen more than six leagues off. The entrance to the noble Bay of Cadiz lies between the city and the town and promontory of Rota, bearing N.W. by N., distant about 1¾ leagues. It is of very great extent, affording in most places good anchorage. The port is on the E. side of the city, where a large mole has been constructed. It is the terminus of many of the principal mail lines from the colonies both in the E. and W. Besides the Xeres wine, for which it yearly receives at least $10,000,000 from England alone, it exports quicksilver, brandy, oil, provisions, flour, and wool. Its manufactures are unimportant. Pop. 57,020.

Carthagena, or *Cartagena*, in the prov. and 29 m. S.S.E. of Murcia, lat. 37° 36′ N., lon. 0° 56 W. It is built at the head of a deep, well-sheltered harbor, flanked by steep hills, and forming one of the best ports of the Mediterranean, notwithstanding which the town has little commerce. The inhabitants are employed chiefly in lead and silver mining, fishing, and exporting barilla, grains, and esparto. Pop. 26,000.

Gibraltar, a rocky promontory, 3 m. in length, and ¾ m. in average breadth, and greatest elevation 1,439 ft., near the S. extremity of *S.*, at the entrance to the Mediterranean. It belongs to Great Britain, and is everywhere fortified by works of great strength and extent, connected on the N. by a low isthmus with Andalusia, in lat. 36° 8′ N., and lon. 5° 21′ W. 5½ m. distant across the sea is the Spanish town of Algeciras, between which and Gibraltar lies the Bay of Gibraltar, called also the Bay of Algeciras, which is about 8 m. long by 5 broad, with a depth in the centre of upwards of 100 fathoms. The anchorage is not good, and the bay is much exposed, especially to the S.W. winds, which occasionally do great damage to the shipping. Gibraltar, being a free port, is resorted to by Spanish smugglers, who drive a thriving trade by introducing contraband goods into *S.* Pop. (including garrison) 25,000.

Majorca, the largest of the Balearic Islands, about 120 m. S. S. E. of Barcelona, between lat 39° 15′ and 40° N., lon. 2° 20′ and 3° 30′ E.; length from E. to W., 64 m.; greatest breadth, 40 m.; area, 1,300 sq. m.; pop. 230,000 On the N. E. coast are the large bays of Puerto Mayor and Puerto Menor, and on the S. E. that of Palma. It produces marble of great beauty, slate, granite, syenite, porphyry, and even coal and iron. The soil is exceedingly fertile, but the agricultural skill of the islanders is imperfect. *Palma*, the capital and principal port of the prov. of the Balearic Islands, with a fine harbor in the Bay of Palma, in lat. 39° 34′ N., lon. 2° 45′ E., has important coastwise, foreign, and colonial trade. The light-houses stand at the entrance of Porti Pi, a narrow road, where the larger vessels anchor. Pop. 53,019.

Malaga, a southern city and seaport in Granada, lat. 36° 43½′ N., lon. 4° 25′ 7″ W. It has an excellent harbor. It is protected on its E. side by a fine mole full 700 yards in length. The light-house of Malaga is 109 yards from the E. mole head, lat. 36° 43′ 30″ N., lon. 4° 25′ 38″ W. It gives a red flash every three minutes, is visible for 15 m., and is 125 ft. above high water. A second light on the E. side of the entrance, 48 yards from the sea, is only 41 ft. above high-water mark. A shoal has grown up round the mole head, and the depth of water throughout the harbor is said to be diminishing. Latterly, however, a dredging machine has been employed to deepen it, by clearing out the mud and accumulating sand. The depth of water, at the entrance to the harbor, and within the mole, is from 26 to 30 ft.; and close to the city from 8 to 10 ft. The harbor could easily accommodate more than 450 merchant ships; it may be entered with all winds, and affords perfect shelter. The principal exports are wines (see SPAIN, WINES OF) and fruit, viz., raisins (the chief), almonds, grapes, figs, lemons, and oil. The raisins exported from Malaga are of three kinds, *muscatel*, *bloom* or *sun raisin*, and *lexias*. The muscatel is the finest raisin in the world. In its preparation no art is used; the grape is merely placed in the sun, and frequently turned. The bloom or sun raisin is a different grape from the muscatel; but its preparation is the same The lexias acquire this name from the liquor or lye in which they are dipped, and which is composed of water, ashes, and oil; these, after being dipped, are also dried in the sun. All muscatel raisins are exported in boxes, and also a part of the bloom raisins. Pop 97,943.

Spain (Wines of). The wines of Spain deservedly rank high in the estimation of foreigners; and if France ranks before Spain in this respect, it is because science has led the way to excellence, and has enabled the French to attain, by delicacy of management, by art and labor, that which nature had wellnigh accorded to Spain without such appliances. The wines of Spain are grown on a soil most congenial to the culture of the vine. The sun ripens the grape without those hazards from chill and humidity to which in a more northern climate the vintage is constantly exposed. Hence the crop rarely fails, though in the southern parts of the country the heat is so intense in summer, that they are obliged to irrigate the vines. From north to south, sites, soils, and exposures of the happiest kind, cover the face of the country. With every disadvantage in the process of making, there are both red and white wines in Spain of surpassing excellence. The rude treatment of the grape at the vintage (which is much changed at Malaga and Xeres, where, from the calls of commerce, improved methods of conducting the vintage have been introduced by foreign interests) has not made the traveller insensible to this truth. The wines commonly drunk by the people of Spain are not the white luscious wines, nor the dry Xeres, but very excellent red wines, often too much deteriorated, it is true, by the carelessness of the manufacturer. The sweet wines are offered at the rate of a glass after each meal, rarely more. The red are to be drunk in the houses of the better classes in a state that may give some idea of their excellent qualities, and untainted by the *odre*, or skin, which the lack of staves for barrels, poverty, or perhaps the want of commercial profit, obliges the peasantry to substitute. The wines grown near the coasts are not liable to this taint, the foreign demand removing the evil.

The prov. of La Mancha is chiefly a wine district, and there, near Manzanares, the justly celebrated wine called *Val de Penas* is made. It is a red wine of excellent body, requiring age to perfect, but then equal to any red wine in the world, for every quality save, perhaps, the delicacy which distinguishes the higher class of Burgundy. In Catalonia, where the soil is propitious, the plains are cultivated, and even the highest cliffs which are accessible are planted with vines. Wherever there is a slip or fall of the cliff leaving a few feet of surface, — a mere ledge, to which there is no other mode of access than being let down by a rope, — even there the vine is set. The fondness of the Spaniards for this branch of husbandry is so strong as to make them, in some places, neglect every other species of cultivation, thus habituated are they to that which long usage has made to them a second nature. The red wines of this province are not remarkable for quality. The Malvasia made at Sitgas is considered very good, but the manufacture of all kinds is negligent beyond example. The exportation, though considerable, has been chiefly for mingling with other wines of less strength. From Valencia a considerable quantity of *Beni Carlos* wine is exported, chiefly to France, to mingle with claret. It comes from a town of that name, to the eastward of the city of Valencia. There is also a wine made at Beni Carlos, of tolerable quality, consumed upon the spot. The wines of La Torre, Segorbe, and Muviedro, are generous and good. At Alicante there is an excellent red wine, *vino tinto*, which becomes of the very first order by age. It is strong and sweet, and is made from grapes of two or three sorts, mingled together. In Navarre, Peralta is remarked for producing a good dessert wine, styled *rancio*, or rusty, from the same cause as the French wines so called, — long keeping. Andalusia is the province in which the wines most valued by foreigners are made, and the favorite species of grape is the Pedro Ximenes. The mountains round Malaga are clothed to the summit with vines, and no less than ten thousand presses are said to be kept at work during the vintage in that and the bordering district. No labor is spared on the vineyards, for here the benefits of commerce, in spite of all obstacles, have made their way, and the wine is fabricated in a better manner than where this active principle of improvement is not felt. It is for the wines of Andalusia that Spain is extolled by foreigners. The mountain wines of Malaga have long been well known out of Spain. There are both sweet and luscious wines made in the districts around that city. There are also several kinds of dry wine. The *Malaga*, usually so called, is always mingled with a proportion of wine burned a little in the boiling, to impart its peculiar taste, and is a powerful wine, long in high repute. This wine is made from a white grape, and contains a very large proportion of alcohol. The *sherry wine*, which some will contend was the "sack" of our British forefathers, is principally made near Cadiz, or about 9 m. from Port St. Mary, at Xeres de la Frontera. This latter place is in the centre of the vineyards which cover a district of about 15 m. square. Forty thousand pipes are made, of which above seventeen thousand are exported annually. It is not to be supposed that these are all wines of the first quality; for they include all that go out of the district, high and low priced. The vineyards are principally on the sides of slopes or declivities. The grapes are left to hang until they begin to shrivel in the sun. The fruit is white, and always gathered between the 9th and 15th of Sept. The bunches are exposed to the sun in baskets for 48 hours after they are gathered, and turned and sorted carefully for the better wines. The high price of sherry is not wonderful, when the care in the growth and the home duties are taken in consideration. A bottle of good sherry fetches 80 cents on the spot, though the common ordinary wine of the country is but 15 cents. The varieties of the wine are produced by the different modes of treating it. Pale sherry is made from the same grape as the brown, to the wine from which is added a couple of bottles of very pure brandy to each butt. The brown and deeper sherries are also the product of the same grape, mingled with boiled wine. A butt of pale light sherry is reduced by boiling to a fifth part, by which time it has acquired a deep, rich, brown color. One half of the boiled wine is substituted for a like quantity of the pale sherry, which is first abstracted from the butt. The wine thus boiled down is made from a grape which is cheap and abundant, and therefore the price of the best brown wine is but little increased by the operation. This boiled wine is also used for coloring other wines in different degrees for the British market, which seems to abhor the pure, unsophisticated juice of the grape, whether in the wines of Porto, Bordeaux, or Spain. In the latter case, however, the wine is not at all deteriorated by the treatment, which cannot be said of the wines of Portugal or of France, when worked up to the English taste. The pale sherries, therefore, are the most pure, containing nothing but the admixture of a little brandy, in addition to the effusion from the press. The different shades of sherry are all caused by the mixture of boiled wine. The wine called *Amontillado* is not always the product of design. The quantity made is small, and it is a drier wine than the common sherry. It is very often the result of accident. To make this wine, the driest of all the Xeres wines, the fruit is plucked two or three weeks earlier than for the other species. It allows of no foreign mixture of any kind. The grapes are trodden by the peasantry with sabots on their feet. The wine is then allowed to ferment for two months or more, when it is racked, and placed in the wood in depositories at Port St. Mary and at

Xeres, not in cellars. These depositories are lightly constructed above ground, and generally hold three tiers of casks. The bungs are carelessly closed without affecting the quality of the wine. It is singular, that, of a hundred butts of sherry out of the same vineyard, some of them will be Amontillado without the owners being able to account for it. Not a drop of brandy can be added to genuine Amontillado without spoiling it. The sherry wines average about 20.40 per cent of alcohol; they are never to be judged by color, but only by taste. See CANARY WINES.

Spangle, a small shining piece of metal to attach to theatrical or other dresses. — To glitter.

Spaniel, a valuable species of dog, of which there are many varieties.

Spanish Black, a powder obtained by burning cork in close vessels.

Spanish-Flies. See CANTHARIDES.

Spanish Grass. See ESPARTO.

Spanker, the gaff-sail on the mizzen-mast.

Spanner, a tool for turning a nut or bolt-head.

Sparables, small iron shoe-brads.

Spar-Deck, the upper deck of a ship, on which loose or spare spars are secured.

Spare-Rib, a joint of pork with the fat and other flesh taken off the rib.

Sparger, a copper cylinder, used by brewers for dashing or sprinkling.

Spars, a general marine term for all masts, yards, booms, etc. — A name for several kinds of mineral.

Sparterie, mats, ropes, and cordage, made of *Esparto* or Spanish broom.

Spat, the young of oysters.

Spathic Iron-Ore, spar-shaped or lamellar ore.

Spatterdashes, a kind of long gaiter or covering for the legs, to keep off mud.

Spatula, an instrument for spreading pills, plasters, etc.

Spawn, the seed of fish. — The matrix of fungi. See MUSHROOM-SPAWN.

Spay, to extirpate the ovaries of a female beast to prevent breeding, and to increase the fattening powers, as a spayed heifer, a spayed sow, etc.

Speaking-Trumpet, a metal mouth-tube for hailing ships at sea, and for making the voice heard at a distance.

Speaking-Tube, a gutta-percha or other pipe for communicating orders from one room in a building to another.

Spear, a lance.

Spearmint, another name for the *Mentha viridis*. See MINT.

Specie, metallic currency; current coins or bullion, as opposed to paper money.

Specification, the particulars given of a patent. — A minute detail of quantities, materials, and plans, for a work or building.

Specific Gravity. See GRAVITY.

Specimen, a sample; an illustration.

Speckled-Wood, wood marked with small spots or dashes.

Spectacles, an optical instrument, consisting of two lenses set in a frame, for assisting or correcting the defects of imperfect vision. The lenses are convex or concave, according to the nature of the defect to be remedied. In old age the pupil of the eye becomes flat, and the rays of light are consequently not refracted sufficiently in passing through it to meet on the retina and produce distinct vision. This defect is remedied by a convex lens, which produces a slight convergency of the rays before they enter the eye. Short-sighted people, on the contrary, require concave lenses; because, in their case, the indistinctness of vision proceeds from too great a curvature of the pupil, which causes the rays to meet in a point before they reach the retina, — a defect which is remedied by giving the rays a slight divergency before they enter the eye.

Imp. duty: Brazil or other rough pebbles, free; glass pebbles, manufactured, 40 per cent. Steel mounted spectacles, 45 per cent; all other, 40 per cent.

Spectroscope, a very important philosophical instrument, invented by Kirchoff and Bunsen, for the examination and comparison of different spectra. The instrument has received many improvements and modifications, but the essential parts are: one or more prisms; a slit, through which the light to be examined is allowed to enter; a tube, having at the other end a lens to render parallel the rays from the slit; a telescope, through which the spectrum is viewed; and usually some apparatus by which the positions of the different lines may be identified.

Speculation, a scheme or project; a money venture on the chance of profit.

Speculator, an adventurer; one who enters into a risk, dabbling in the funds, shares, or stocks, or buying or selling goods upon the chance of a rise in price.

Speculum, a reflector of polished metal. — A surgeon's instrument for examining inward parts.

Speed-Indicator, a gauge for testing the velocity of steam-engines or machines.

Speiss, impure nickel.

Spelding, a dried haddock.

Spell, a turn; the portion of time given to any work.

Spelter, impure zinc. See ZINC.

Spermaceti [Fr. *blanc de baleine;* Ger. *Wallrath;* It. *spermaceti;* Sp. *esperma de balena*], a product obtained from the brain of the *Physeter macrocephalus*, a species of whale inhabiting the Southern Ocean. The brain being dug out from the cavity of the head, the oil is separated from it by dripping. The residue is crude spermaceti, of which an ordinary-sized whale will yield twelve barrels. It then concretes into a white, crystallized, brittle, semi-transparent, unctuous substance, nearly inodorous and insipid. On being cut into small pieces it assumes a flaky aspect. It is very heavy, its sp. gr. being 9.433. It is used in the manufacture of candles, in medicine, etc. *Imp.* duty, 20 per cent; of American fisheries, free.

Spetches, a name for glue pieces; the offal of skin and hides.

Spherometer, an instrument invented by Mr. Ross for measuring the curvature of lenses.

Spice, the common name for pleasant or pungent vegetable substances, used for flavoring food and condiments, such as nutmegs and mace, cinnamon, pimento, ginger, and pepper. — A technical name among sugar-refiners for bullocks'-blood.

Spice Islands. See MOLUCCAS.

Spice Nut, a gingerbread nut.

Spiceries, a collective term under which many of the stimulant and aromatic condiments are grouped.

Spiegeleisen. See IRON.

Spigot, a peg to stop the vent-hole in a cask or a faucet.

Spike, a large nail, above 10*d*. 12*d*. spikes are 3¼ in. long, 45 to the pound; 30*d*. spikes are 4½ in. long, 16 to the pound. Spikes for railroads are larger and are of several patterns. Spikes owe their efficiency to the adhesion of the spike to the wood into which it is driven, which adhesion resists the withdrawal of the spike. On the American railways, where slight rails are often simply spiked down upon wooden sleepers, the form of the spike

and the kind of wood are found to have much to do with the firmness of the holding. Spikes known by the names of *narrow flat, wide flat, grooved and swelled, grooved and notched, plain cylindrical, square hammered*, etc., are used; and pains have been taken to ascertain the conditions under which each kind is likely to render most service.

Imp. duty: Iron cut, $1\frac{1}{2}$ cts. per lb.; iron wrought, $2\frac{1}{2}$ cts. per lb.; brass or composition, 35 per cent; copper, or copper chief value, 40 per cent.

Spike (Oil of). See LAVENDER.

Spile-Hole, the air-hole or vent of a cask.

Spillikins, pegs of wood, bone, or ivory, for marking the score of cribbage or other games.

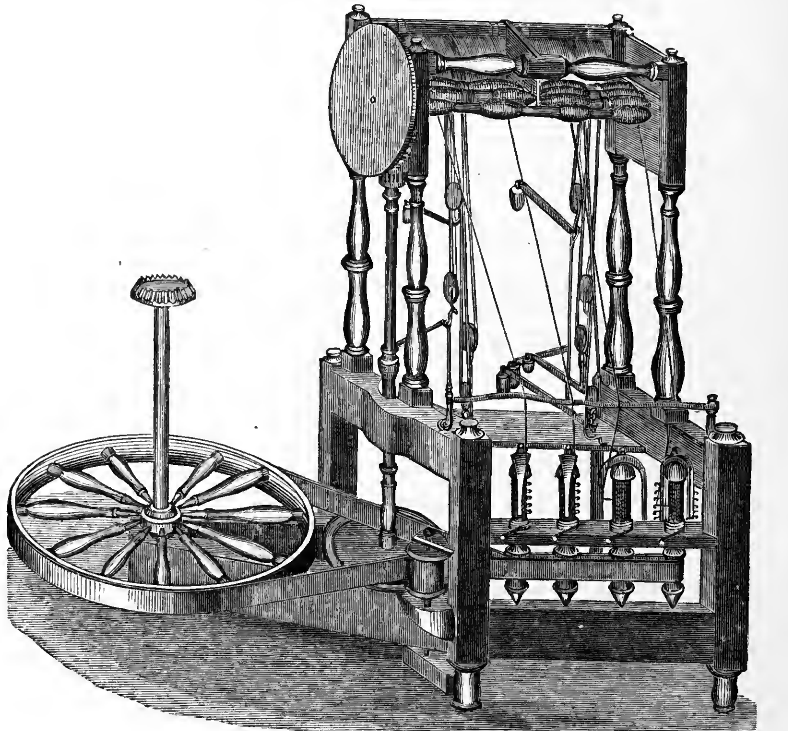

Fig. 454. — SPINNING (WATER-FRAME).

Spills, small pieces of wood used for lighting pipes or making matches.

Spin, to twist or twirl threads.

Spinach, the *Spinacia oleracea*, the leaves of which are a common nutritious pot-herb.

Spinal, a kind of unwrought inkle.

Spindle, a slender, pointed rod or pin on which anything turns or revolves; the axis of a wheel or roller; as, the *spindle* of a vane, the *spindle* of a capstan. — A long, slender stalk, as of a plant. — The fusee of a watch. — In cotton-yarn, a measure containing 18 hanks, or 15,120 yards; in linen-yarn, 24 heers, or 14,400 yards. — *Dead-spindle.* The spindle of the tail-stock; the non-revolving arbor of a machine-tool, in contradistinction from *live-spindle*, or spindle of the head-stock, or revolving arbor.

Spinel, an ornamental stone which occurs crystallized either in regular octahedrons, or in macles presenting different forms. It is of various shades of red, violet, or yellow, more rarely black. Sp. gr. 3.5. By lapidaries, the scarlet-colored is termed *spinel ruby;* the rose-red, *balas ruby;* the yellow or orange red, the *rubicelle;* and the violet-colored, *alamandine ruby.* The first is the most valuable. Spinel is not so hard as the oriental ruby, and is readily distinguished, both by its color and crystallization. It is principally found in Ceylon and the Malay peninsula. The pale-blue and pearl-gray varieties are found in Sweden.

Spinning. The twisting of minute filaments into a thread or yarn for weaving is almost as old an art as weaving itself; almost, because some of the vegetable fibres can be spun without weaving. In all the varieties with which we are best acquainted, — cotton, flax, hemp, jute, silk, wool, — short filaments are converted into long, thin into thick, straight into twisted; various modes of preparation initiate these changes, but *S.* is the finishing process. Under the names of the principal textile goods these preparatory operations are noticed, and also some of those connected with the *S.;* but a few general observations may be useful here.

The simplest *S.* process is with the *distaff and spindle*, the method of poor peasants of the present day, and in former days the only one. The distaff, held under the left arm, is a stick about a yard long, with a cleft or fork at the top, on which carded wool, cotton, etc., are wound. The spindle, about a foot long, is another stick with a slit at the top. With the thumb and finger of the right hand, fibres are drawn out from the distaff to a certain length or distance, and twisted spirally one round another; the yarn, when thus spun or twisted, is wound round the spindle. In order to expedite the process, a *S.-wheel* was invented to supersede the distaff and spindle. Here the spindle is made to rotate by means of a wheel turned by hand, greatly increasing the rapidity. Soft fleecy rolls or cardings of prepared fibres, a foot or so in length, are attached one by one to the spindle; they are drawn out by the fingers

of the left hand, and stretched and twisted by the rotation of the spindle and wheel. A coarse thread is thus made, which a repetition of the process converts into fine thread. James Hargreaves invented an ingenious machine, which makes one wheel turn many spindles; this he called the *S.-jenny*. He improved on this from time to time, till he made one wheel work 80 spindles. The spindles are placed upright. The 80 rovings from the 80 spindles are drawn out horizontally, and clasped by two flat edges which meet together. This clasp travels to and fro on four small wheels; during the drawing away from the spindles the roving is stretched and attenuated into a thin yarn, to which a twist is given by the rapid revolution of all the bobbins; and when the clasp is driven the other way, these lengths of spun yarn become wound round the bobbins. Still further advances were made. Richard Arkwright invented his *S.-frame* to do that which could not be so well done by Hargreaves' *S.*-jenny. To spin by rollers had been more or less attempted by Wyatt, Paul, Highs, and Kay; but Arkwright (once a poor barber at Preston) was the first to give practical realization to the idea. His machine (Fig. 454) was called the *water-frame*, because it was first worked by water-power; and the yarn, a harder and firmer thread than could be made by the jenny, obtained the technical name of *water-twist*. After many changes and improvements, and the substitution of steam for manual and water power, Arkwright's process settled down into what is now called *throstle-S.* The bobbins full of prepared roving are placed on the top of the *throstle-frame*. See Fig. 111, p. 231. Rollers and bobbins and fliers draw out the fibres, elongating and attenuating them, and at the same time twisting them tightly into a compact yarn, well adapted for the *warp* or long threads of woven goods. In the technical language of a cotton-mill, the throstle is used for the hard, coarse yarns up to about No. 40. Samuel Crompton invented a very beautiful machine, in which he combined the *S.-jenny* of Hargreaves with the *S.-roller* of Arkwright; he called it the *mule-jenny* (see Fig. 112, p. 232), and the process *mule-S.* In this mule action the bobbins containing the rovings are on a fixed frame; the spindles by which the rovings are to be twisted into yarn are on a movable frame; the movable frame, by travelling 4 or 5 feet outward, then an equal distance backward, and so on alternately, stretches and attenuates the threads. The two sets of operations, elongating and *S.*, succeed each other with exquisite regularity; 600 or 700 threads, all ranged parallel, being managed by self-regulating mechanism. *Mule* yarn, as it is technically called, being twisted more softly and carefully than *throstle* yarn, is suitable for the *weft* or cross-threads of coarse goods, and for both warp and weft of fine goods. See further under COTTON, FLAX, HEMP, JUTE, SILK, WOOL, for minor diversities in the *S.* process.

Spirit, a name generally applied to fluids, mostly of a lighter specific character than water, and obtained by distillation. Thus, the essential oil of turpentine is called *spirit* of turpentine. Essential oils dissolved in alcohol are called spirits, as *spirit* of aniseseed, peppermint, etc., because formerly prepared by distilling the herbs with alcohol. The volatile alkali ammonia, distilled and condensed in cold alcohol, is called *spirit* of ammonia; even hydrochloric acid is often called *spirit of salts*. But in a stricter sense, the term *spirit* is understood to mean *alcohol* in its potable condition, of which there are very numerous varieties, deriving their special characters from the substances used in their production. See SPIRITS.

Spirit-Lamp, a lamp for burning spirits to heat anything, as metals. It is used for many purposes in the arts where heat rather than light is required.

Spirit of Mindererus. See AMMONIA.

Spirit of Wine. See ALCOHOL.

Spirits. All inflammable liquors obtained by distillation, as brandy, rum, whiskey, gin, etc. The manufacture of spirits is placed under the *surveillance* of the excise or internal revenue officers, and a very large revenue is obtained from it. The Chapter IV. of Title XXXV. of the U. States Revised Statutes lays down most of the regulations to be followed by the distillers in the manuf., and by the officers in charging the duties. This chapter is of great length, having no fewer than 88 sections (3247-3334); it is, besides, exceedingly complicated. It would, therefore, be to no purpose to attempt giving any abstract of it in this place. Every one carrying on the business of distillation must apply to the commissioner of the internal revenue for a copy of the *Regulations and Instructions Concerning the Tax on Distilled Spirits*, and be practically acquainted with its contents.

There are, perhaps, no better subjects for taxation than spirituous and fermented liquors. They are essentially luxuries; and while moderate duties on them are, in consequence of their being very generally used, exceedingly productive, the increase of price which they occasion has a tendency to lessen their consumption by the poor, to whom, when taken in excess, they are exceedingly pernicious. Few governments, however, have been satisfied with imposing moderate duties on spirits; but, partly with the view of increasing the revenue, and partly with the view of placing them beyond the reach of the lower classes, have almost invariably loaded them with such oppressively high duties as have entirely defeated both objects. The imposition of such duties does not take away the appetite for spirits; and as no vigilance of the officers or severity of the laws has been found sufficient to secure a monopoly of the market to the legal distillers, the real effect of the high duties has been to throw the supply of a large proportion of the demand into the hands of the illicit distiller, as it was experienced not many years ago in this country, to the great detriment of the public treasury, when an exorbitant internal tax of $2 per proof-gallon was imposed on spirits, exclusive of a heavy license duty on retailers. The tax was reduced to 70 cents in 1868, and again raised to its actual and equitable rate of 90 cents by Act of March 3, 1875. The consequences of the change were highly beneficial. An instant stop was put to smuggling; and if the vice of drunkenness was not materially diminished, it has not been stated that it was increased. — For customs duties on importation of foreign spirits, see ALCOHOL.

The quantity of distilled spirits produced in the U. States during the year 1879 was 56,103,053 gallons. The following table shows the number of proof-gallons of spirits rectified in each State and Territory, and the internal revenue receipts from distilleries, during the same year: —

States and Territories.	Gallons.	States and Territories.	Gallons.
Alabama......	29,783 11	Nebraska......	83,988.43
California.....	1,713,708.82	Nevada.......	9,703 00
Colorado......	197.83	New Jersey....	123,104 23
Connecticut...	87,119.00	New Mexico....	550.22
Georgia.......	204,893 75	New York.....	2,139,444,51
Idaho.........	14,061.92	North Carolina.	40,813.36
Illinois........	4,038,207.02	Ohio..........	9,832,216.95
Indiana......	104,669.89	Oregon........	31,989.26
Iowa..........	71,224.18	Pennsylvania..	5,942,417.42
Kansas.......	48,235.82	Rhode Island..	29,537.30
Kentucky......	4,107,821.88	Tennessee......	388,629.25
Louisiana.....	1,090,318.91	Texas.........	63,758 42
Maryland.....	2,808,438.64	Utah.........	11,986.91
Massachusetts.	1,302,128.07	Virginia.......	565,604.86
Michigan.....	163,295.86	West Virginia..	38,624.50
Minnesota.....	103,726.84	Wisconsin.....	997,409.58
Missouri......	2,902,814.26		
Montana.......	5,639.23	Total......	39,096,063.23

Internal revenue receipts from distilleries: —

Sources.	Receipts.
Spirits distilled from apples, peaches, or grapes.	$992,634.58
Spirits distilled from materials other than apples, peaches, or grapes....................	44,633,898.48
Wine made in imitation of champagne.........	....
Rectifiers..........................	210,068.70
Dealers, retail liquor..........................	3,875,973 26
Dealers, wholesale liquor......................	434,708.35
Manufacturers of stills........................	1,068.77
Stills or worms manufactured................	1,980.00
Stamps for distilled spirits intended for export.	6,890.50
Stamps, distillery warehouse..................	101,494.90
Stamps, rectifiers'...........................	120,469.00
Stamps, wholesale liquor dealers'..............	41,021.90
Stamps, special bonded warehouse............	294.10
Interest on tax upon spirits.................	313.26
Total..................................	$50,420,815.80

Statement of the quantity, in proof-gallons, of each kind of spirits known to the trade, produced in the U. States in 1879: —

Kind of spirit.	Gallons.	Kind of spirit.	Gallons.
Bourbon whiskey.	6,405,520	Pure, neutral, or Cologne spirits.	11,108,023
Rye whiskey.....	2,834,119	Miscellaneous....	4,096,342
Alcohol.........	10,277,725		
Rum............	1,603,376		
Gin............	364,963		
High wines......	19,412,985	Total.......	56,103,053

Statement of exports of domestic spirits to foreign countries during the year 1879: —

Kinds of spirits.	Gallons.	Value.
From grain — chiefly to France, Spain, Argentine Republic, Turkey in Europe, and Austria................	7,052,266	$2,262,150
From molasses, chiefly to British possessions in Africa................	1,239,082	398,136
From other materials................	20,309	12,955
Total.........................	8,311,657	$2,673,241

For the same year, the value of our imports of spirits and cordials, in casks or bottles, was $1,697,500, of which $879,881 was from France.

Spirograph. See Recording Instruments.

Spittoon, a box or crock for saliva.

Splicing, a sailor's term for uniting the ends of ropes by opening and interlacing the strands.

Splinter-Bar, a cross-piece supporting the springs of a carriage.

Split, a weaver's term for one thread in plain work. — To burst asunder; to separate in parts.

Split-Lift, a piece of in-sole leather, used in shoemaking.

Splitting-Machine. See Tanning.

Split-Ring, a ring which opens to hold keys, or to string a guard on.

Splits, a term, in the leather trade, for divided skins which have been separated into two sections by the cutting machine; these being termed splits and salted splits.

Spokes, bars of wood radiating from the nave of a wheel to the felly, at equal distances from one another. — The rounds of a ladder. — A contrivance for skidding the wheels of a vehicle.

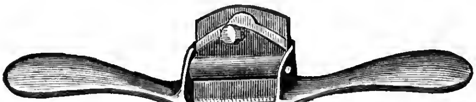

Fig. 455. — Spoke-Shave.

Spoke-Shave, a plane with a handle at each side (Fig. 455), for working on hollow or curved wood.

Sponge [Fr. *éponge;* Ger. *Schwamm;* It. *spugna;* Sp. *esponja*], a light, soft, very porous and compressible substance, readily imbibing water, and as readily giving it out again. It is found adhering to rocks, particularly in the Mediterranean Sea, about the islands of the Archipelago. It was formerly supposed to be a vegetable production, but is now classed among the zoöphytes; and analyzed, it yields the same principles as animal substances in general. The inhabitants in several of the Greek islands have been trained from their infancy to dive for *S.* They adhere firmly to the bottom, and are not detached without a good deal of trouble. The extraordinary clearness of the water facilitates the operations of the divers. Smyrna is the great market for *S.* It is also fished for near the Bahama Islands. Large quantities of both coarse and fine *S.* come into commerce for toilet and surgical use, for common washing purposes, for making into cloth, hats, and for other uses. *Imp.* duty, 20 per cent.

Spool, a piece of cane or reed, or a hollow cylinder of wood with a ridge at each end, used by weavers for winding their yarn; a bobbin.

The prevalence of white birch along the St. Francis River above Drummondville, Canada, has made that town an important centre for the production of spools. When received at the factories the wood is first sawed into strips about 4 ft. long, and from 1 in. to 1½ in. square, according to the size of the spools to be made. The woodmen can turn out about 130 gross per day. The round blocks pass from them to the finishers, who place them in machines which give them the shape of spools, and make them quite smooth. The spools are thrown loosely into a large cylinder which revolves slowly, so that the spools are polished by the constant rubbing upon each other for some time. On being taken out of the cylinder, they are placed in a hopper with an opening at the bottom, through which they pass down a slide for inspection. Here the inspector sits and watches closely to see that no imperfect spools are allowed to pass; and a very small knot or scratch is sufficient to condemn them. They are packed in large boxes, made the proper size, and no additional packing is needed. The packers receive ¼ cent per gross for packing, and a smart boy who is accustomed to the work can pack about 200 gross per day. One proprietor ships over 2,000,000 spools per month to England, and another firm ships over 1,000,000 spools to Glasgow, Scotland.

Spool Cotton, sewing cotton wound on a spool and sold by the dozen. The spools usually contain 200, 300, or 500 yards of thread of the various numbers ranging from No. 8 to No. 200, — the higher numbers being the finest. The principal places of manufacture are Paisley, in Scotland, and Newark, in New Jersey.

Spoon, a small domestic utensil, with a bowl or concave part, and a handle, used for taking up liquids, etc., at table, and for dipping.

Spout, a tube or shoot. — A curved mouth or nozzle, as to a tea-pot, watering-pot, etc. — A slang term for pledging goods at a pawnbroker's.

Spouts, boxes or shoots, down which coals are run from wagons into ships.

Spreader, an attachment. — The branch pipe of a fire-engine for scattering the water over a large surface.

Sprig, a thin nail, without a head. — An embroidered branch of a flower.

Spring, an elastic body or band. — In marine language, a check on the cable for disconnecting it; to crack or split a mast or spar; "to spring a leak" is to let in water suddenly.

Spring-Back, the cover of a book which is not attached to the back, but yields in opening.

Spring-Balance, an instrument for determining the weight of bodies, consisting of a spiral spring, with an index, and pointed.

Spring-Bed, an elastic or air mattress.

Spring-Box. See Barrel.

Springe, a gin, noose, or snare to catch birds.

Springer and Liner, a workman who puts in watch springs.

Springfield. See Illinois.

Springfield Fire and Marine Insurance Co., located in Springfield, Mass., organized in 1851. *Statement*, Jan. 1, 1880: Cap. stock paid up, $750,000; net surplus, $444,211. Risks in force, $95,795,663; premiums, $1,145,965. Premiums received since the organization of the Co., $11,161,414; losses paid, $7,423,421; cash dividends paid to stockholders, $1,317,042.

Spring-Forgers, workmen in the cutlery trade, who form the spring or piece of steel at the back of clasp and folding pocket-knives.

Spring-Maker, a manufacturer of steel compound springs for carriages, or of metal springs for easy chairs.

Sprit, a small boom or gaff, used with a fore and aft sail in some boats.

Sprit-Sail, a sail extended on a sprit-sail yard.

Sprocket-Wheel. See Cog-Wheel.

Spruce, a name for several species of the fir tribe, including those with scattered leaves and pendent cones. See Pine. — A fermented liquor made of treacle or molasses, and a decoction of the leaves and branches of the spruce-fir. It is sometimes called black-beer. See Mum.

Spud, a sharp, straight, narrow spade, with a long handle, for digging up heavy-rooted weeds.

Spun-Silk, the yarn obtained from the short, broken, or imperfect filaments in the process of reeling and throwing silk, which, instead of being reeled off in long, continuous threads, is carded and spun; floss silk; silk fabrics woven from spun silk, and sometimes called raw silk. — *T. McElrath.*

Spun-Yarn, a cord formed by twisting together two or three rope-yarns; old junk, or rope twisted into yarns, used for various purposes on shipboard.

Spur. See SPURS.

Spurge, a name for several species of *Euphorbia*, used medicinally, but possessing purgative and poisonous properties.

Spurious, adulterated; not genuine.

Spurred-Rye. See ERGOT.

Spur-Rowel, the revolving pricking-wheel of a spur.

Spurs, spiked irons for the bottoms of the boots of seamen, who stand on the carcase to strip the blubber from a whale. — Pricking instruments with rowels fastened on the heels of a horseman's boot.

Spur-Wheel, a cog-wheel.

Spy-Glass, a small telescope.

Squab, a soft cushion; a sofa. — A name applied to a young, unfledged bird, as a squab pigeon.

Square, in arithmetic, the product of a number multiplied by itself. Thus, the squares of the numbers 1, 2, 3, 4, 25, etc., are respectively, 1, 4, 9, 16, 625, etc. — *Cube* is the product of a number obtained by taking that number three times as a factor; as, 64, obtained from 4 multiplied by 4, multiplied by 4.

Square, a rule or instrument by which workmen ascertain whether an angle is a right angle or not. — In carpentry, 100 ft. superficial, — that is, 10 × 10; a unit of measurement used in boarding and roofing. — A term commonly applied to a pane of glass.

Square-Mile, a land measure of 640 acres.

Square-Rigged, in seamanship, vessels which have the yards and sails across the masts, instead of fore and aft, or in the direction of the length of the vessel.

Square-Sail, a large, fore-sided sail, extended on a lower yard.

Square-Timber, heavy timber or saw-logs squared with the axe.

Squash, a name for the *Cucurbita melopepo.* See GOURDS.

Squat, in mining, a mineral of tin ore and spar; a small, separate vein of ore. — To locate or settle down on waste land without right.

Squeezing-Machine. See BLEACHING.

Squill, the sliced and dried acrid bulb of *Urginea scilla*, a drug obtained from the Levant.

Squirrel, a small rodent, a species of *Sciurus.* The fur of several varieties is much used for linings, tippets, etc. See FUR.

Squirt, a syringe.

Stabber, a marlin-spike. — A sailmaker's pricker. — A pegging-awl.

Stabbing-Machine, a machine used by bookbinders for perforating a pile of folded and gathered signatures for the insertion of the stitching-thread.

Stable Fixtures, the racks, mangers, and other fittings for stables.

Stack, a pile of anything, as a stack of wood, hay, corn, etc. A stack of wood is 408 cubic ft. — A column of chimneys, or an elevated chimney to a factory.

Stade, a landing or shipping place.

Staff, a stick carried in the hand for support or defence by a person walking; a stick or club used as a weapon. — A long piece of wood; a stick; the long handle of an instrument; a pole or stick used for many purposes. — An ensign of authority; a badge of office.

Stag, a male red deer. — A stock-exchange term for application for letters of allotment for shares in a new company, whose object is to sell immediately at a premium, without any intention of subscribing or holding shares.

Stage, the floor on which theatrical performances are exhibited; the theatre; the place of scenic entertainments; theatrical representations. — A place where anything is publicly exhibited; a place of action or performance. — A place of rest on a journey, or where a relay of horses is taken. — The distance between two places of rest on a road. — A single step; a degree of advance; degree of progression. — A large vehicle running between stations, for the accommodation of the public.

Stager, a horse running in a stage carriage.

Staging, a structure of posts and boards for support, as for building.

Stails, a commercial name in England for handles of mops and brooms.

Stained Fabrics, cotton goods tinged with a color combining with the fabric.

Stained Glass. See GLASS.

Stair-Carpet, narrow carpeting of different make and material, usually 27 or 36 in. wide, for covering flights of stairs.

Staircase, a series of stone or wooden steps for ascending buildings.

Stair Rods, iron rods, coated with brass, fixed in eyes, to secure and keep a stair-carpet smooth in the bend of each step.

Stake, a small piece of wood or timber, sharpened at one end, set or fixed in the ground, or prepared for setting, as a support to something; a piece of long, rough wood. — That which is pledged or wagered. — A small anvil to straighten cold iron or to cut or punch upon with a cold chisel or punch. — One of the regular ranges or planks on the bottom and sides of a ship, reaching from the stem to the stern. — *At stake*, hazarded; in danger; at risk.

Stall, a stand or place where a horse or an ox is kept and fed; the division of a stable, or the apartment for one horse or ox. — A bench, form, or frame of shelves in the open air, where anything is exposed for sale; a small house or shed in which an occupation is carried on. — The seat of an ecclesiastical dignitary in the choir of a church.

Stallion, an entire or ungelded horse; one kept for serving mares.

Stamp, any instrument for making impressions on other bodies. — A mark imprinted; an impression; that which is marked. — A thing stamped; a picture cut in wood or metal, or made by impression; a cut; a plate. — A mark or seal set upon paper or parchment in regard to things chargeable with duty to government, as evidence that the duty is paid. — An instrument for cutting out materials, as paper, leather, etc., into various forms by a downward pressure. — A paper bearing an impression or device authorized by law, and adapted for attachment to some subject of duty or excise. The internal revenue acts of the U. States of 1862, and subsequent years, require stamps to be applied on almost every form of legal instrument and commercial papers, and on the packages of a great variety of manufactured goods, under severe penalties in the way of fines. Many of these have been since taken off, but several stamp taxes have been retained, such as bank-checks, matches, playing-cards, proprietary medicines, fermented and distilled spirits, cigars, and tobacco. See BRAND.

Stamp Head, the iron block at the end of a vertical stamping-bar.

Stamping-Mill, an engine consisting of pestles moved by water or steam power, for crushing ore. The stamping-mill shown in Fig. 456 is worked by an undershot water-wheel, and has two batteries of six stamps each.

Stamping-Press, a press for imprinting, by a sunken die, bills of lading, notes, envelopes, drafts, etc. — A press for swaging sheet-metal between dies to the requisite form.

Stand, a stall in a market. — A desk or rest for music, newspapers, etc. — A support for a barrel, etc. — A weight for pitch of 2½ to 3 cwt.

Standard, that which is established by sovereign power, as a rule or measure by which others are to be adjusted. — That which is established as a rule or model by the authority of public opinion, or by custom. — A standing tree or stem; a tree not supported or attached to the wall. — The proportion of weight of fine metal and alloy in coins established by authority. — A timber in the form of a knee, with one arm on the deck, and the other fayed to a ship's side.

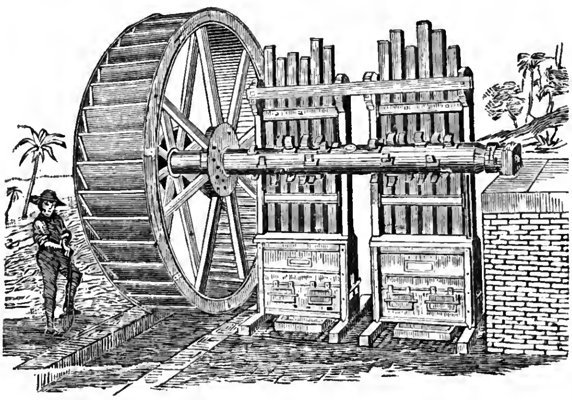

Fig. 456. — Stamping-Mill.

Standard Fire-Insurance Co., located in New York City, organized in 1859. *Statement*, Jan. 1, 1880: Cap. stock paid up, $200,000; net surplus, $169,090. Risks in force, $12,890,898; premiums, $90,761. Premiums received since the organization of the Co., $2,214,906; losses paid, $1,277,018; cash dividends paid to stockholders, $433,180.

Standard Mark, in Great Britain, a legal assay mark for gold of 22 carats fine, and for silver of 11 oz. 2 dwt. Articles of all standards, capable of bearing a stamp, are marked also with the initials of the maker's name, the arms or mark of the Assay Office, and a letter for the date of the year; gold of 18 carats fine, a crown and the figures 18. Silver of the new standard, which is 11 oz. 10 dwt. fine, bears the figure of Britannia. See Hall-Mark. In America the good articles of jewelry are frequently stamped, but there is no legal assay mark. See Jewelry.

Standing, commercial position or repute.

Standing Rigging, the stationary or fixed ropes and chains, etc., of a ship, attached to the hull, used as stays and hold-fasts, to keep the masts, bowsprits, etc., firm and secure.

Stanhope, a sporting phaeton.

Stanhope Press. See Printing-Press.

Stannary, a tin-mine or tin-works.

Staple, the thread or pile of wool, cotton, or flax.

Staple Articles, the chief commodities dealt in; the principal produce of a district or country.

Star Anise. See Aniseseed.

Starboard, the right-hand of a vessel looking forward.

Starch, a kind of flower or farina that exists in a large number of seeds, roots, tubers, stems, fruits, and lichens. It forms with boiling water a kind of mucilage which cools down into a jelly; and it is to this mucilaginous quality that it mainly owes its usefulness in the arts. Wheat, potato, rice, Indian corn, arrowroot, sago, and tapioca are the chief kinds of *S.* producers. It has a fine white color, scarcely any smell, and very little taste. It is largely used for stiffening articles of wearing apparel, and the best kinds, reduced to powder, as an article of food. It is also much employed by the calico-printer, for making size for paper, etc., in the manuf. of dextrine, etc. It is extensively manufactured in the U. States. Our exports of *S.* for the year 1879, chiefly to Germany, Holland, England, and the Argentine Republic, amounted to 14,298,654 lbs., valued at $601,797.

Imp. duty: potato or corn, 1 ct. per lb. and 20 per cent; rice or any other, 3 cts. per lb. and 20 per cent.

Manuf. — *S.* is extracted from grain by the old process of fermentation, and by the non-fermenting process. By the former process the grain is steeped in water till it becomes soft enough to mash easily between the fingers. It is then passed through a malt-mill or between rollers, and again mixed with water. Fermentation sets in, and lactic and acetic acids are formed, which disintegrate the cellular structure and liberate the *S.* granules. These are collected by repeated washings and precipitations, the process being continued for several days. Thorough washing and draining remove the soluble matters, and the *S.* left behind is next dried in blocks about 6 in. square; as the water escapes from them, the masses break up into the columnar fragments peculiar to *S.* The other method consists in kneading the flour into dough with water, and then washing on a sieve of No. 120 wire in a stream of water as long as the water passes through milky. The *S.* in suspension and the sugary portion in solution are caught below the sieve, and the gluten nearly all remains behind in a sticky mass. What passes through is left to ferment 24 hours in an oven at 68° F. The portion of the gluten carried through with the *S.* is then separated and removed by skimming. The *S.* is then treated like that otherwise obtained. Potato *S.* is made from rasped or grated potatoes; it does not, as other *S.*, assume the columnar form in drying. It is much more susceptible of moisture than corn *S.*, and goods which are stiffened with it are apt to yield in damp weather, and to become mouldy if laid by. In 1842-43, Mr. Thomas Kingsford introduced in this country a process for the economical manuf. of a superior article of *S.* from Indian corn, and from his success then and improvements subsequently introduced have grown up an industry of great magnitude. The *S.* manufactories of Thomas Kingsford & Son, at Oswego, N. Y., and of Messrs. Duryea, at Glen Cove, Long Island, are now the two largest in the world. Their products, both laundry and edible corn-*S.*, are obtained by different processes, and largely exported to Europe. In the Oswego *S.* Factory the grain first passes through immense fan mills, to remove chaff and dirt, or any substances which might afterward injure the machinery. Thence it is passed to enormous vats, where it is soaked, so as to render its constituents more easily separated, that the *S.* may be extracted. After a sufficient time here the grinding process follows; and for this purpose 24 pairs of burr stones and 6 pairs of heavy iron rollers are used; these mills work day and night, and, operating on wet grain, change it into pulp rather than into flour, the object being to crush and thoroughly disintegrate the particles. This pulp then passes through a great number of screens and drum sieves, which do the first part of the work of separating the *S.* from the hull, the refuse being used as a food for cattle. The milky fluid which results from the washing is conducted into immense cisterns or vats, of which there are in all the factories 689, having an aggregate capacity of 3,150,000 gallons. The liquid, however, has to receive several washings, during which various solvents and filtered water are used for the removal of all impurities, and the separation of the pure *S.* from all the other constituents of the grain. For this purpose the establishment has 48 pumps, capable of raising 850,000 gallons of water per hour; and there are 6¼ m. of gutters in use for the various

distributions of the contents of the vats; besides 4 m. of water-pipes, varying in size from 2 to 24 inches in diameter. After this is done, the *S.*-water, as it may be called, is allowed to run into moulds, where, when it has entirely settled, the deposit will have made a long, box-like cake, which may be broken into the required squares, each weighing about 7 lbs. after drying, the quantity desired for each package.

Star Stone, a variety of sapphire, which, when cut in a certain direction, presents a reflection of light in the form of a star.

Starching-Machine. See BLEACHING.

Star Fire-Insurance Co., located in New York City, organized in 1864. *Statement,* Jan. 1, 1880: Cap. stock paid up, $300,000; net surplus, $121,-591. Risks in force, $33,130,708; premiums, $246,-774. Premiums received since the organization of the Co., $2,351,145; losses paid, $1,262,969; cash dividends paid to stockholders, $305,791.

Statement, a declaration; an account rendered; details or explanatory particulars furnished.

State Mutual Life-Insurance Co., located in Worcester, Mass., organized in 1845. *Statement,* Jan. 1, 1880: Assets, $2,533,356.61; liabilities, $1,949,128.47; policies in force, 4,650, amounting to $9,736,510; premiums, $275,519; dividends paid to policy-holders, $490,600.

Station, a depot.—A starting or stopping place on a railroad. — An assigned point of duty.

Stationer, one who sells paper, ink, pens, blank books, rulers, sealing-wax, and other articles pertaining to the use of the desk in the counting-room.

Stationery, writing materials and books; the articles dealt in by a stationer.

Statistics, facts and figures relating to the commerce, progress, or social condition of a country.

Statuary, the art of carving images, or making statues or images, as representatives of real persons or things. — A branch of sculpture. — Statues taken collectively. — One who professes or practises the art of carving images or making statues.

Statue, a work of plastic art, executed in marble, bronze, clay, or other suitable material, and representing a living being. *Imp.* duty, 10 per cent.

Statuette, a small statue.

Staves, shaped lengths of wood for making casks, chiefly of oak; but also made of ash and other wood. See SHOOKS.

Stay Busk, a stiff piece of wood, steel, or whalebone for the front support of a woman's stays.

Stay Lace, a silk or thread used for fastening a lady's stays.

Stays, large ropes leading forward, used to support and secure the masts of ships. — See CORSET.

Stay-Sail, a ship's sail which is hoisted by rings upon a stay or rope.

Stead, the frame of a bed.

Steal, to thieve; to remove chandestinely; to defraud.

Steam. The vast importance of *S.* in the arts depends mainly on these two circumstances: that the change of condition from water to *S.*, and *vice versâ,* is very easily brought about; and that the difference in bulk between those two states is enormously great. *Visible S.*, as from the mouth of a tea-kettle, is not really *S.*, it is a mass of minute particles of water; *S.*, properly so called, or aqueous vapor, being quite transparent and invisible. The density of dry air and that of *S.*, at an equal temperature and under equal pressure, are as 8 to 5. The dampest air is, under equal temperature and pressure, the lightest; and this is one reason why the barometer often falls in damp weather. The mechanical properties of *S.*, so long as it remains really *S.*, are identical with those of air; but the extreme susceptibility to change of condition under change of temperature often veils this similarity. *S.* is rising from water at all temperatures; but as, at a given temperature, the *S.* can only attain a given density and pressure, its formation at low temperatures is slow and hardly to be detected. When a given bulk of *S.* is confined within a vessel of definite dimensions, change in its temperature leads to the three conditions of *sub-saturated, saturated,* and *super-heated S.*, distinctions very important in the working of *S.*-engines. When water at 212° is producing *S.*, the *S.* is at the ordinary pressure of the atmosphere: becoming *high-pressure* or *low-pressure S.* when the temperature exceeds or falls short of this limit. Taking 30 in. of mercury as the pressure of the atmosphere, *S.* at 76° F. has a pressure of only 1 in.; 105°, 2 in.; 127°, 4 in.; 162°, 10 in.; 180°, 15 in.; 192°, 20 in.; 204°, 25 in. These are all examples of low-pressure *S.* High-pressure, on the contrary, presents the following figures: 226°, 40 in.; 248°, 60 in.; 266°, 80 in.; 280°, 100 in.; 326°, 200 in.; 361°, 400 in.; 418°, 600 in. The last named would be called "20 atmospheres." These figures show how great is the expansive or bursting tension of *S.* when heated much beyond 212°. *S.* and water can coexist at almost any temperature; but the *S.* always contains more heat than the water, although the thermometer fails to detect it. There is a large amount called *latent* heat, which is an essential condition to the existence of *S.*, but of which the thermometer tells us nothing. All these matters concerning the temperature, density, pressure, and latent heat of *S.* are of great importance in the theory and action of the *S.*-engine. *S.* is much employed, also, in heating water, melting solids, and boiling solutions of various kinds.

Steam-Boat, a vessel propelled through the water by the agency of steam. The term, however, is generally restricted to steam river-boats.

Steam-Boiler. See BOILER.

Steam-Carriage, a carriage propelled by steam on common roads, on tramroads, or on rails, the latter, more commonly called *Locomotive-engine,* being to this day the only species of steam-vehicle which has been permanently successful.

Fig. 457 represents the section of a locomotive as now constructed. The boiler is cylindrical; and at one end is placed the fire-box, partly enclosed in the cylindrical boiler, and surrounded on all sides by the water, except where the furnace door is placed, and at the bottom, where the fuel is heaped up on bars which permit the cinders to drop out. At the other end of the boiler, a space beneath the chimney, called the smoke-box, is connected with the fire-box by a great number of brass pipes, open at both ends, firmly fixed in the end plates of the boiler. These tubes are from 1¼ in. to 2 in. in diameter and are very numerous,—usually about 180, but sometimes nearly double that number. They therefore present a large heating surface to the water, which stands at a level high enough to cover them all and the top of the fire-box. The boiler of the locomotive is not exposed to the air, which would, if allowed to come in contact with it, carry off a large amount of heat. The outer surface is therefore protected from this cooling effect by covering it with a substance which does not permit the heat readily to pass through it. Nothing is found to answer better than felt; and the boiler is accordingly covered with a thick layer of this substance, over which is placed a layer of strips of wood ¾ in. thick, and the whole is surrounded with thin sheet-iron. It is this sheet-iron alone that is visible on the outside. The level of the water in the boiler is indicated by a gauge, which is merely a very strong glass tube; and the water carried in the tender is forced in as required, by a pump or a Giffard's injector. The steam leaves the boiler from the upper part of the *steam-dome,* A, where it enters the pipe, B; the object being to prevent water from passing over with the steam into the pipe. The steam passes through the *regulator,* C, which can be closed or opened to any extent required by the handle, D, and rushes along the pipe, E, which is wholly within the boiler, but divides into two branches when it reaches the smoke-box, in order to conduct the steam to the cylinders. Of these there are two, one on each side, each having a slide-valve, by means of which the steam is admitted before and behind the pistons alternately, and escapes through the blast-pipe, F, up the chimney, G, increasing the draught of the fire by drawing

the flame through the longitudinal tubes in proportion to the rush of steam; and thus the rate of consumption of fuel adjusts itself to the work the engine is performing, even when the loads and speeds are very different. Though the plane of section passing through the centre of boiler would not cut the cylinders, one of them is shown in section. H is the piston; K the connecting-rod jointed to the crank, L, the latter being formed by forging the axle with four rectangular angles, thus ; and the crank bendings from the two cylinders are placed in planes at right angles to each other, so that when one is at the "dead point," the other is in a position to receive the full power of the piston. There are two safety-valves, one at M, the other at N; the latter being shut up so that it cannot be tampered with. See LINK-MOTION. — The power of a locomotive, of course, depends on the pressure of the steam and the size of the cylinder, etc.; but a very much lower limit than is imposed by these conditions is set to the power of the engine to draw loads by the adhesion between the driving-wheels and the rails. By the term "adhesion," which is commonly used in this case, nothing more is really meant than the friction between surfaces of iron. When the resistance of the load drawn is greater than this friction, the wheels turn round and slip on the rails without advancing. The adhesion depends upon the pressure between the surfaces, and upon their condition. It is greater in proportion as the weight supported by the driving-wheels is greater, and when the rails are clean and dry it is equal to from 15 to 20 per cent of that part of the weight of the engine which rests on the driving-wheels; but when the rails are moist, or, as it is called, "greasy," the tractive power may be only 5 per cent of the weight; about one tenth may be taken as an average. Suppose that 30 tons of the weight of a locomotive are supported by the driving-wheels, that locomotive could not be employed to drag a train of which the resistance would cause a greater pull upon the coupling-links of the tender than they would be subject to if they were used to suspend a weight of 3 tons. The number of pairs of wheels in a locomotive varies from two to five; most commonly there are three pairs; and one, two, or all, are driven to the engine, the wheels being coupled accordingly; very often two pairs are coupled. The pressure at which the steam is used in the locomotive is sometimes very considerable. A pressure equal to 120 lbs. on each square inch of the boiler is quite usual. The greater economy obtained by the employment of high-pressure steam acting expansively in the cylinder points to the probability of much higher pressure being adopted. There is practically no limit but the power of the materials to resist enormous strains, and there is no reason in the nature of things, why steam of even 500 lbs. per square inch should not be employed, if it were found otherwise desirable. It need hardly be said that locomotives are invariably constructed of the very best materials, and with workmanship of the most perfect kind. The boilers are always tested, by hydraulic pressure, to several times the amount of the highest pressure the steam is required to have, and great care is bestowed upon the construction of the safety-valves, so that the steam may blow off when the due amount of pressure is exceeded. The explosion of a locomotive is, considering the number of engines in constant use, a very rare occurrence, and is probably in all cases owing to the sudden generation of a large quantity of steam, and not to an excessive pressure produced gradually. Among the causes capable of producing explosive generation of steam may be mentioned the deposition of a hard crust of stony matter, derived from the water; this crust allows the boiler to be over-heated, and if water should then find its way into contact with the heated metal, a large quantity of steam will be abruptly generated. Or, should the water in the boiler become too low, parts of the boiler may become so heated that on the admission of fresh water it would be suddenly converted into steam. — Locomotive engines for propelling carriages on common roads were invented many years ago by Gurney, Anderson, Hancock, and others. Such engines do not appear to have found much favor, though the idea has been successfully realized in the traction engines lately introduced. Probably the application of steam power to the propulsion of vehicles along common roads fell into neglect on account of the superior advantages of railroads, but the common road locomotive is at present receiving some attention. It is not so much mechanical difficulties that stand in the way of this economical system of locomotion, as the prejudices and interests which have always to be overcome before the world can profit by new inventions. See BOILER, INCRUSTATION, RAILROAD, etc.

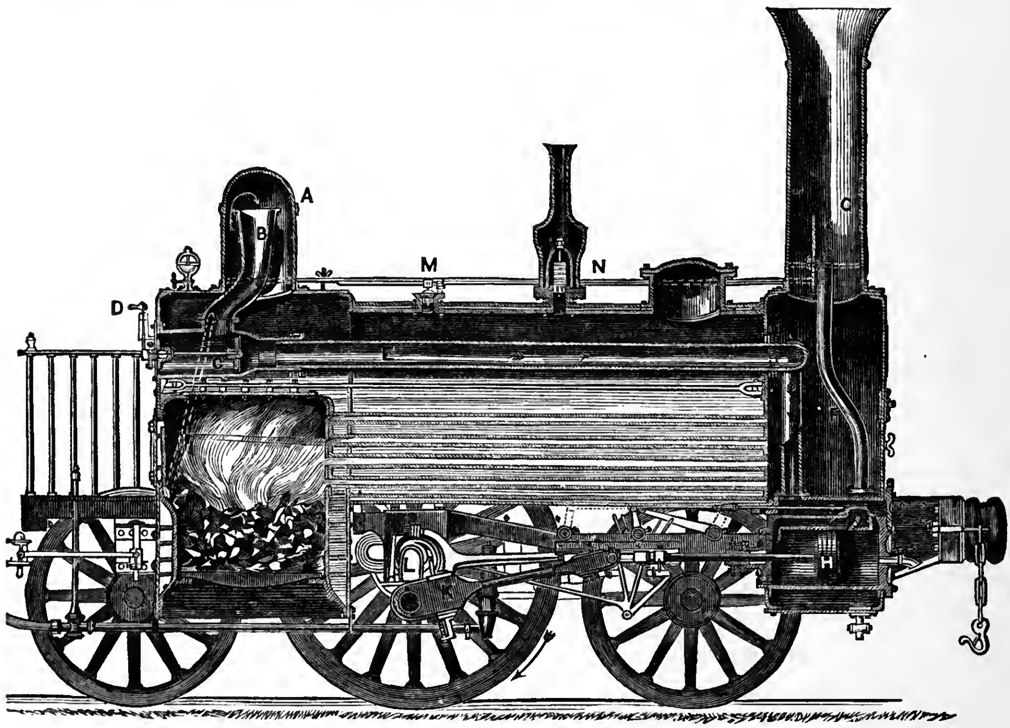

Fig. 457. — BRITISH EXPRESS LOCOMOTIVE ENGINE.

Steam-Engine. If there is one invention which deserves to be called the greatest of all, in relation to its influence on material progress, perhaps it is the *steam-engine.* Even those who would name in preference the *printing-press* must bear in mind that, without the steam-engine, the power of the press in diffusing knowledge would always have been limited.

The action of the steam-engine depends virtually on this — that a cubic foot of water becomes 1,600 or 1,700 cubic feet of steam when it exchanges the liquid for the aëriform state; and

that the violent disturbance of air, to make room for this steam, gives motion to the pistons, shafts, beams, cranks, wheels, etc. The projects of the Marquis of Worcester, Savory, Moreland, Pepin, Newcomen, and others before the time of Watt, gradually habituated the minds of inventors to recognize the fact that this expansion of water into steam is a great and available source of power, and that a country in which coal is cheap ought to develop this power into usefulness. Then came James Watt's discoveries and inventions, just about a century ago, — notably the condenser, and the admission of steam both above and below the piston. Numberless and beautiful as have been the subsequent inventions, it remains true that the fundamental characteristics of the steam-engine are nearly as Watt left them. Whatever may be the external form and general arrangements of the several parts of a steam-engine, the classification into *condensing* and *high-pressure* is clear and convenient. A *condensing engine*, or, with equal correctness of designation, *low-pressure engine*, has such an arrangement of cylinder that, after the piston has been driven one way, the steam escapes into a vessel called the *condenser*, where a spray of cold water re-condenses it. A vacuum, more or less perfect, being thus made in the condenser, the cylinder is prepared for the action of a new portion of steam in pressing the piston downwards; and so the process goes on, the steam used in causing one movement of the piston being removed by condensation before a renewed supply is admitted to act on the other side of the piston. Valves of various kinds and beautiful action regulate the ingress and egress of steam; gauges denote the degree of vacuum and other particulars; while pumps and pipes carry away the water which collects in the condenser. A *high-pressure* or *non-condensing* engine has no condenser and no air-pump; it is smaller and cheaper than the condensing engine. On the other hand, it is obliged to be worked at a higher pressure of steam, a circumstance attended with certain disadvantages. The steam, after being admitted from the boiler into the cylinder, presses the piston along in one direction, but as there is no condensing and no vacuum, the steam can only escape into the open air. This it must do before a new supply of steam can enter to press the piston in the opposite direction. One side or the other of the piston is always in communication with the atmosphere, the pressure of which must be overcome before the next movement of the piston can be effected. Hence there is a great waste of power arising, as compared with the condensing engine; and some of the machinery has to be made additionally strong to bear the force of the high-pressure steam. On the other hand, when steam has once been raised to a certain temperature, a small increase of heat will produce a large increase of power; the greater the power raised, the less *relatively* is the quantity of fuel necessary to raise it, other things being equal. Nevertheless, the *total* consumption of fuel is about 15 per cent less in a condensing than in a high-pressure engine, — a circumstance that often determines the choice of the former in places where fuel is dear; while, on the other hand, where water is scarce, the high-pressure becomes the more useful of the two. Although condensing and non-condensing are the principal designations, there are others which must be briefly adverted to. A *compound engine* partakes of the qualities of the other two. The steam, having been somewhat expanded in a small cylinder, is admitted to a larger one, where it works the piston, and passes into a condenser. A *beam-engine* is one of various forms adopted, not in the mode of applying the steam, but in applying the power to work the fly-wheel. There is a horizontal beam at the top, having a connection with the piston-rod at one end and the crank-shaft at the other. It is claimed that in this form the cylinder and piston wear better; but there are certain disadvantages which lead to other forms being more or less generally employed. A *horizontal engine* has the cylinder horizontal, and the fly-wheel worked without the intervention of a beam. Its superiority over the beam-engine consists in the following items: it is less heavy; it occupies less room; it is more simple in construction and in working; it is less liable to break down; the piston can be worked more rapidly; finally, it costs less to make, and less to build a foundation on which the engine may rest. An *oscillating engine* has the cylinder so placed as to oscillate like a pendulum, and thereby conform to the crank, the motion of which is derived directly from the piston-rod. A *rotary engine* has no cylinder and piston of the usual form, no reciprocation of up-and-down or to-and-fro motion; the steam acts at once upon a revolving apparatus, which communicates with the fly-wheel. *Disk* engines, *vertical* engines, *direct-action* engines, *trunk* engines, *crank-overhead* engines, are other designations which have been more or less employed; and there is, indeed, no practical limit to the diversities which the working apparatus may present. The characteristics of the American stationary engine are high steam pressure without condensation, an expansion valve gear with drop cut-off adjustable by the governor, high piston speed, and lightness combined with strength of construction.

Marine Steam-Engines. — The manner in which the steam-engine is rendered an instrument for the propulsion of vessels must, in its general features, be so familiar to every one as to require no explanation. The *side-lever engine*, formerly in the most extensive use, and still employed in many paddle vessels, occupies an inconvenient amount of space, and also exhibits a needless complication of parts. The strain has to be transmitted not merely through the piston-rod and crank-shaft, but also through the cross-head and cross-tail, side-rods and connecting-rod, and the side-levers or beams. This multiplication of the moving parts obviously increases the risk of fracture, and the side-levers themselves are peculiarly susceptible of accident from this cause, since by the properties of a lever of this class the stress or strain upon the beam at the main centre or pivot is twice as great as the strain upon the piston. These defects of the side-lever engine have caused the introduction of the *oscillating engine*. In this engine the top of the piston-rod is coupled immediately with the crank-pin, and as the piston-rod moves up and down in a line coincident with the axis of the cylinder, while the crank-pin revolves in a circle, it is necessary that the cylinder should be able to vibrate laterally, to enable the motions of the piston-rod and crank-pin to be reconciled with one another. The cylinder is consequently provided on each side with a short hollow pivot or trunnion, on which it swings; and through one of these trunnions the steam enters the cylinder from the boiler, while through the other the steam escapes from the cylinder to the condenser. The alternate introduction of the steam above and below the piston is governed by a slide-valve attached to the cylinder, and swinging with it; or, in large engines, two valves may be employed for this purpose, and by their suitable attachment to the cylinder they will balance one another. In steam vessels in which oscillating engines are employed, the cylinders are set immediately beneath the cranks, and the engines occupy but little more in the length of the vessel than the diameter of the cylinder.

Steamer, STEAMSHIP, an ocean-going vessel driven by steam, either paddle-wheels or propellers. — The name *steamer* is also applied to a spare top fitting on a saucepan with holes at the bottom, for cooking potatoes, etc., by steam.

Steam Fire-Engine. See FIRE-ENGINE.

Steam-Gauge, a contrivance to show the exact amount of pressure of steam in a boiler, of which there is an infinite variety.

The principle on which the instrument is constructed will be easily understood by an examination of Fig. 458, which represents one of Bourdon's gauges. The gauge is screwed into some part of the boiler, where it can always be seen by the person in charge. The stop-cock, A, communicates with the curved metallic tube, C, which is the essential part of the contrivance. This tube is of the flattened form shown at D, having its greatest breadth perpendicular to the plane in which the tube is curved, and it is closed at the end, E, where it is attached to the rod, F, so that any movement of E causes the axle carrying the index-finger, F, to turn, and the index then moves along the graduated arc. The connection is sometimes made by wheelwork, instead of by the simple plan shown in the figure. The front plate is represented as partly broken away, in order to show the internal arrangement, which, of course, is not visible in the real instrument, where only the index-finger and graduated scale are seen protected by a glass plate. When a curved tube of the shape here described is subjected to a greater pressure on the inside than on the outside, it tends to become straighter, and the end, E, moves outward; but when the pressure is removed, the tube resumes its former shape. The graduations on the scale are made by marking the position of the index when known pressures are applied. The amounts of pressure, when the gauges are being graduated, are known by the compression produced in air contained in another apparatus. Gauges constructed on Bourdon's principle are applied to other purposes, and can be made strong enough to measure very great pressures, such as several thousand pounds on the sq. in.; they may also be made so delicate as to measure variations of pressure below that of the atmosphere. The simplicity and small size of these gauges, and the readiness with which they can be attached, render them most convenient instruments wherever the pressure of a gas or liquid is required to be known.

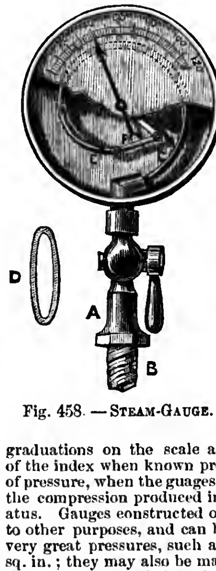

Fig. 458. — STEAM-GAUGE.

Steam-Governor. See GOVERNOR.

Steam-Hammer. See HAMMER.

Steam-Indicator. See STEAM-GAUGE.

Steam-Packet, a steam-vessel running periodically between certain points.

Steam-Pump, a pump worked by steam.

Steam-Tug, a small steam vessel employed to tow vessels, barges, dredgers, etc.

Stearine, the harder portion of animal fats; oleine or elain being the softer one. Stearine yields an acid, called *stearic acid*, and having the form of brilliant white scaly crystals, which is now largely employed in soap and candle making.

Steatite. See SOAPSTONE.

Steel [Fr. *acier;* Ger. *Stahl;* It. *acciajo;* Sp. *acero*]. Steel may be defined as iron chemically combined with sufficient carbon to give it an extreme amount of toughness and hardness without brittleness. Its properties, and the statistics of its production in the U. States are given under IRON.

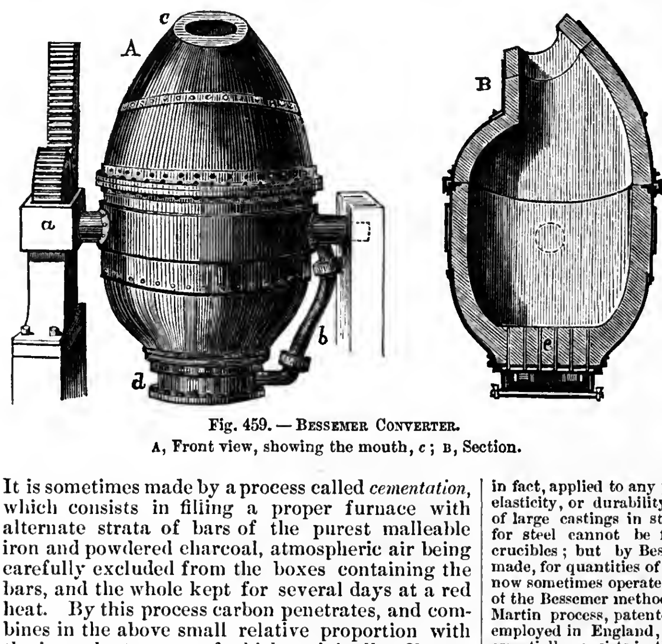

Fig. 459. — BESSEMER CONVERTER.
A, Front view, showing the mouth, *c*; B, Section.

It is sometimes made by a process called *cementation*, which consists in filling a proper furnace with alternate strata of bars of the purest malleable iron and powdered charcoal, atmospheric air being carefully excluded from the boxes containing the bars, and the whole kept for several days at a red heat. By this process carbon penetrates, and combines in the above small relative proportion with the iron, the texture of which, originally fibrous, becomes *granular*, and its surface acquires a *blistered* character. Much of the steel now used is, however, made directly from cast-iron, by removing a portion of the carbon which the latter contains. This is effected by exposing the molten iron to a current of air, either on the sole of a reverberatory furnace, or in large egg-shaped iron vessels lined with fire-clay. The former process is commonly termed *puddled steel;* the latter, known as *Bessemer's*, is rapidly superseding all other processes of production.

The vessel in which the Bessemer operation is conducted is termed a *converter*, and its construction will be understood by reference to Fig. 459. It is an egg-shaped vessel, about $3\frac{1}{2}$ ft. in diameter, made of wrought iron, in two parts, and lined in the inside with a thick, infusible coating, made from ground fire-bricks and a certain kind of sandstone. The two portions are united by flanges strongly bolted together, and the converter swings on trunnions, one of which is hollow and admits the air-blast by the pipe, *b*, to the base of the vessel. This pipe, which of course turns on the trunnion with the converter, conducts the air to a kind of chamber, *d*, from which it passes into the vessel, through about 50 holes of $\frac{1}{2}$ in. diameter. To the other trunnion a toothed wheel is attached, which engages the teeth of a rack receiving motion from hydraulic pressure in a cylinder. The iron for the operation is melted in a furnace having its hearth above the level of the converter, which is turned so that its axis is horizontal and its mouth upwards. In this position it is ready to receive the molten iron, which is conveyed to it by a trough, lined with sand, when the furnace is tapped. The metal is allowed to pour in until its surface is nearly at the level of the lowest holes through which the air enters. Usually about 5 tons of iron are thus operated on. The blast having first been turned on at a pressure of 15 lbs. to the sq. in., the hydraulic power is set to work and the converter is slowly brought back to an upright position. The pressure of the current of air prevents any of the fluid metal from entering the blow-holes, and the blast of cold air is continued for a period varying from twelve to twenty minutes, — until, in fact, all the silicon and carbon have been entirely consumed. The converter is then slowly turned back into the horizontal position, and the blast is shut off, while a certain weight of melted cast iron of a particular composition is run in; the blowing is resumed, the vessel brought to the upright position, and the blast continued for about five minutes, in order thoroughly to incorporate the ingredients. At the end of this time, the vessel is again lowered, the blast is shut off, and the contents of the converter are run off into a vessel of wrought iron, lined with sand and provided with an iron plug, coated with sand, fitting into a socket, so that, when required, the plug may be raised, and the molten steel allowed to flow out into the moulds, which it does in a stream about an inch in diameter. In this process it will be observed that the steel is not produced by stopping the decarbonization at a certain stage, but by adding to it cast iron containing such a proportion of carbon as, when added to the pure iron in the converter, will produce good steel. Although the results of the process are not so perfect as to permit Bessemer steel to be generally used for purposes requiring a fine, hard steel, yet the method has already caused a new development of the applications of steel. Not only was the production of five tons of malleable metal from pig iron, in one operation, in the short space of half an hour, a surprise for metallurgists; but there was the unprecedented circumstance of this mass of metal being in a state of perfect fusion. A substance which has hitherto been so costly as to be employed only for knives, springs, and other small articles, is now produced on a scale which admits of its being used in the construction of bridges, railways, and buildings; or, in fact, applied to any purpose where great tenacity, hardness, elasticity, or durability would be desirable. The production of large castings in steel was long a matter of impossibility, for steel cannot be fused, except in comparatively small crucibles; but by Bessemer's process large castings may be made, for quantities of pig iron, about ten tons in weight, are now sometimes operated on in the converter. The only rival of the Bessemer method for the production of cheap steel is the Martin process, patented in 1865 and 1867, and now widely employed in England, in France, and in the U. States. It essentially consists in the decarbonization of cast iron by fusion with wrought iron, iron sponge, steel scraps, or iron oxide, in the hearth of a reverberatory furnace, heated with gas, the flame of which assists the reaction, and the consequent recarbonization or deoxidation of the bath by the addition, at the close of the process, of white iron, spiegeleison, or ferro-manganese. The advantages claimed for the Martin as compared with the Bessemer process are: its less expensive plant; the greater duration of the operation, permitting by means of sampling more complete control of the quality of the product, and also conducing to greater uniformity of result; and, as a consequence of the forging, the practicability of employing materials which have not hitherto been considered suitable for the Bessemer converter. The celebrated Indian *wootz* is prepared, by a rude process, from a very rich magnetic oxide of iron. *Damascus steel* consists of a very highly carburetted metal, which, by careful cooling and annealing, separates into two distinct compounds of iron and carbon, giving it the peculiar appearance known as *damascening*. The wonderful perfection of the Indian and Damascus blades is due as much to careful and patient manipulation as to their chemical composition. The most characteristic property possessed by steel is that of becoming intensely hard when made red-hot and plunged into cold water. If the heat be intense and the cooling very sudden, an arrangement of particles takes place so as to give the steel a hardness sufficient to scratch glass. If, on the contrary, the metal be allowed to cool gradually, it will become soft. Between these two points of extreme hardness and brittleness on the one side, and extreme softness and toughness on the other, intermediate stages exist, giving the metal properties fitting it for a variety of purposes. These different degrees of hardness are obtained by the

process known as *tempering*. The steel is first heated to the maximum and plunged into cold water, by which means the greatest hardness and brittleness are obtained. It is then partially or wholly polished and carefully reheated, and allowed to cool again gradually. The degree to which the temperature is raised in the second heating regulates its ultimate hardness, and is indicated by the color assumed by the polished portion. The first perceptible tint is a light straw-color, which makes its appearance when the heat reaches 430° to 450° F. This gives the metal a maximum of hardness, with a certain amount of elasticity, fitting it for lancets, razors, and surgical instruments; at 470° a full yellow is produced, which is the temper employed for pen-knives, scalpels, and fine cutlery. The temperature of 490° gives a brownish-orange, the temper for shears and chisels used for cutting iron. At 510° the brownish-yellow becomes flecked with purple, the tint for pocket-knives. 520° gives a bluish-purple, fit for table cutlery; while the different shades of blue from 530° to 570° indicate a temper proper for watch-springs, sword-blades, saws, and instruments requiring great elasticity. Beyond this temperature the metal becomes too soft to be used for cutting instruments. The surfaces of articles manufactured from soft iron, such as the wearing parts of gun-locks, are converted into steel by heating them in boxes, in contact with carbonaceous matter, or by sprinkling them while red-hot with powdered ferrocyanide of potassium. This process is termed *case-hardening*. *Imp.* duty: Steel in ingots, bars, coils, and sheets, valued at 7 cts. or less per lb., 2¼ cts. per lb.; valued at above 7 cts., not above 11 cts. per lb., 3 cts per lb.; valued at above 11 cts. per lb., 3½ cts. per lb. and 10 per cent. — Steel in any form, n. o. p. f., 30 per cent. — Steel wire, not less than ¼ in. in diameter, valued at 7 cts. or less per lb., 2½ cts. per lb.; valued at 7 cts., not above 11 cts. per lb., 3 cts. per lb.; valued at above 11 cts. per lb., 3½ cts. per lb., and 10 per cent; less than ¼ in. in diameter, not less than No. 16 wire-gauge, 2½ cts. per lb., and 20 per cent; less or finer than No. 16, 3 cts. per lb., and 20 per cent; crinoline, corset, and hat wire, 9 cts. per lb., and 10 per cent; all, n. o. p. f., 30 per cent. — Railway bars, 1¼ cts. per lb.; part steel, 1 ct. per lb. — Squares, 6 cts. per lb. and 30 per cent. — Steel-plates engraved, 25 per cent. — Manufactures of steel, n. o. p. f., 45 per cent.

Steel Engravings, a term applied to impressions on paper, printed from engraved steel plates.

Steel Pen. In making the usual steel pens, with which we are all familiar, steel is rolled in sheets of a particular thickness, cut into broad strips, heated and annealed, scoured, and again rolled. Each strip is cut up into blanks by means of a cutting-out press, the length of the blank being in the direction of the fibre. One or more holes are stamped in each blank, as well as the name of the maker, etc. Each blank, still a flat piece of steel, is then stamped up into the usual convexity and concavity. The nibs are ground by friction upon an emery-wheel; the slits are made by chisel-stampers of peculiar shape. Various processes of heating, annealing, and scouring intervene between the other operations. The colors, mostly brown, but sometimes bluish, are produced by exposing the pens to heat in a rotatory cylinder, and removing them when a particular degree of oxidation is attained. Mr. Timmins's statistics of the steel-pen manufacture at Birmingham, England, comprise some curious items. Mr. Perry paid $1.25 per pen to the first person he employed, and for many years paid his workmen at the rate of 75 cts. per doz. It was considered a great reduction when a card of nine pens was sold for $1.25. There are now 2,500 operatives engaged in the manufacture in Birmingham. They make 100,000 gross of steel pens per week; using 10 tons of high-class sheet steel for the purpose. The selling value to the trade ranges from 3 to 25 cts. per gross for the usual kinds of pen, and 15 cts. to $2.50 per gross for barrel pens, omitting specimens of very special kind. So wonderful have been the advances made, that pens on which twelve distinct processes have been required are sold wholesale at the rate of *two cts. a hundred!* One manufacturer has more than 500 marks or stamps for various buyers, who require their own names or devices on the pens; another reckons his annual produce at 150,000,000 pens. Steel pens of good quality are now largely manufactured in the U. States, chiefly in Philadelphia; but the best qualities continue to be imported from Birmingham. *Imp.* duty, 10 cts. per gross and 25 per cent.

Steel-Plate. See COPPER-PLATE ENGRAVING.

Steelyard, a weighing-machine consisting of a lever of unequal arms. In its most common form, the scale is suspended from the shorter arm, and the weight is adjustable upon the longer arm, which is graduated.

Steep, a dye; a cleansing wash; a rennet bag. — To dip or soak.

Steeping. See MALT.

Steerage, that part of the between-decks of a vessel which is just forward of the cabin; the accommodation afforded to third-class passengers in a passenger-ship.

Steering, the act or art of directing and governing a ship or other vessel in her course.

Steersman, the pilot of a boat; a helmsman.

Steinberger. See GERMANY (WINES OF).

Stencilling is a sort of midway process between printing and decorative painting, a cheap substitute for both. A pattern is drawn upon a thin plate of metal, pasteboard, or any other convenient material, and perforations cut through in conformity to it. This, which constitutes a *stencil-plate*, is laid upon the substance to be painted; a brush, dipped in color, is passed to and fro over it; and a pattern becomes painted according to the parts which are not covered by the plate. Walls of rooms are colored in a cheap and rapid way by this process, in lieu of paper-hanging; and devices of various kinds, in connection with many of the manufacturing arts, are produced by this process of stencilling upon wood, plaster, paper, woven fabrics, and other kinds of groundwork.

Stenography, abbreviated writing; the art of taking down the words of a speaker in short-hand characters.

Step, a stair, or the round of a ladder; a pace; the hole or socket which supports a boat's mast.

Stere, the unit of French solid measure, employed for measuring firewood, stone, etc. It is equal to 35.31741 cubic feet, and is the same as the kilolitre in measures of capacity.

Stereoscope, a frame with a pair of lenses, in which two pictures or representations of an object, taken at slightly different angles, are made to combine, and appear as one statue or figure, etc., standing out in bold relief. Cities, portraits, and scenes are thus brought out vividly before the eye. The optical coalescence of two foci is very beautiful; but when the calculations and measurements are once made, the shaping and adjustment of the pieces of glass and wood become merely workshop processes, not very special in their character. *S.* are chiefly imported from Birmingham, England.

Imp. duty: with lenses, or cut glass, 40 per cent: stereoscopic views on glass, slides or prints, photographs on paper, 20 per cent.

Stereotyping. See ELECTROTYPING.

Sterlet, the *Acipenser ruthenus*, a species of sturgeon, the swimming-bladder of which yields the best Russian isinglass. Its flesh is prized, and its roe yields caviare.

Sterling, according to a fine standard; a term which has long been applied to the genuine and standard British money.

Sterling Fire-Insurance Co., located in New York City, organized in 1864. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $28,519; risks in force, $11,560,122; premiums, $62,805; premiums received since the

organization of the Co., $944,205; losses paid, $387,468; cash dividends paid to stockholders, $247,000.

Stern, the after end or hindermost part of a vessel.

Sternutatory, a medicine or application to the nose, which causes sneezing.

Stethometer, an instrument for determining the differential mobility of the opposite sides of the chest in respiration.

Stethoscope, a surgical instrument of valuable aid in the process of auscultation. It consists of a tube about ten inches in length, made of wood or sometimes of gutta-percha, widening considerably at one end, and but slightly at the other. The wide end is applied to the chest or other part of the patient, the physician putting his ear to the narrow end, and from the sounds emitted by the heart, lungs, etc., the state of these parts may be ascertained.

Stettin. See GERMANY.

Stevedore, a person who superintends the stowage of a ship's cargo.

Steward, the providore, or chief cabin servant in a steamer or passenger-ship.

Stick, the mast or spar for a ship. — A walking-cane or straight twig. — A compositor's instrument for holding type.

Stick-Lac. See LAC.

Still, a metal apparatus with a boiler, a head, and a condenser or worm-pipe, through which the vapor ascends, in the distillation of liquids. See DISTILLATION.

Stilton. See CHEESE.

Stilts, props or poles for walking on.

Stimulants, medicines or strong drinks, which increase the action of the pulse, and excite the energies of the system.

Stipple, to engrave by means of dots. See COPPER-PLATE ENGRAVING.

Stipulate, to bargain; to covenant.

Stirrup-Iron, an iron hoop or rest for a horseman's foot.

Stirrup-Leather, the strap or suspending support for a stirrup-iron.

Stitch, to fasten with a needle and thread.

Stive, a name given to the floating dust in flour-mills, during the operation of grinding.

Stock, a fund; the capital of a banking or other incorporated company, usually divided into shares. See STOCKS. — The capital employed in business by an individual or by a firm, including merchandise, money, and credits. See STOCK IN TRADE. — Material used in manuf., as rags and pulp for paper; hides, bark, and oil for leather, etc. — In farming phraseology, the animals maintained upon a farm are called *live-stock*, in contradistinction from the implements and carriages employed thereon, which are termed *dead-stock* — The ways, or frame-work of timbers on which a vessel rests while building, and from which she is launched. — The chief supporting part, the part in which others become inserted, or to which they are attached; as, specifically: (1.) The part of a tool for boring wood with a crank, whose end rests against the breast of the workman. (2.) The wood in which the barrel of a musket or other fire-arm is fixed; also, a part of a gun-carriage. (3.) The piece of timber in which the shank of an anchor is infixed. (4.) A die-stock.

Stock Account, in book-keeping, the account in a ledger or stock-book, which is credited with all sums or values contributed or added to the capital of the concern, and debited with whatever is at any time subducted therefrom. — *To take stock* is to make an inventory of stock or goods on hand.

Stock-Broker, a broker who deals in the purchase and sale of stocks or shares in the public funds, or government bonds, shares and bonds of banking, railroads, and other joint-stock companies, etc., for other parties for a commission.

Stock Exchange, a building or room in which stock-brokers meet to transact their business of purchasing or selling stocks. In large cities, as New York and London, the stock business is transacted through the medium of the members of the board of brokers, governed by rules and regulations made by themselves, to which all the members are obliged to subject themselves. Admission is procured by ballot, and a member defaulting in his obligations forfeits his seat. A regular register of all the transactions is kept by an officer of the association, and questions arising between the members are generally decided by an arbitration committee. The official record of sales is the best evidence of the price of any stock on any particular day. The stocks dealt in at the session of the board are those which are placed on the list, by a regular vote of the association; and when it is proposed to add a stock to the list, a committee is appointed to examine into the matter, and the board is generally guided by the report of such committee.

Stock-Fish, a trade name for codfish, sun-dried, but not salted.

Stockholder, a shareholder or proprietor of stock in the public funds, or in the capital of a bank or commercial corporation.

Stockholm. See SWEDEN AND NORWAY.

Stockings, hose knitted or woven, coverings for the feet and legs, of cotton, silk, or worsted.

Stock in Trade, the goods kept on sale by a merchant; the assets and effects actually employed in his business; the fittings and appliances of a workman. The term "stock in trade," when used in a policy of insurance in reference to the business of a mechanic, as a baker, includes not only the materials used by him, but the tools, fixtures, and implements necessary for the carrying on of his business; and the term in question was held to have a broader application to the business of mechanics than to that of merchants. But in a case where a certain sum was insured on the "stock of watches, watch trimmings, etc.," contained in a certain store, and also another sum on the "furniture and fixtures" in said store, it was held that the word *stock* was used in opposition to *furniture* and *fixtures*, and was intended to cover the stock usually contained in such a store, such as silverware, plated ware, fine hardware, clocks, watch tools, britannia ware, and fancy goods, as well as watches and watch trimmings.

Stock-Jobber, one who dabbles or speculates in government bonds or other stocks; one whose occupation is to buy and sell stocks; an outsider or intermediate agent between buyer and seller, who makes a marginal price at which shares, etc., are to be bought or sold in the stock-exchange.

Stock-List, a list published daily or periodically, enumerating the leading stocks dealt in; the prices current; the actual transactions, etc.

Stock Maker, a manufacturer of stiff neck-bands worn by men.

Stockman, a herdsman; a keeper of cattle.

Stock-Market, the stock exchange; also the general state of demand for stocks and securities on a certain day. — A place for the sale of cattle.

Stock on Hand, the unsold merchandise on hand.

Stocks, shares in joint-stock companies or corporations, or in the obligations of a government for its funded debt; in England, the former are termed *shares*, and the latter only, *stocks*. — A frame in which refractory animals are held for shoeing or veterinary purposes.

Stoke-Hole, the mouth of the gate of a furnace.

Stockton-on-Tees. See GREAT BRITAIN.

Stomacher, the front body-piece of a dress worn by women; an ornament or support to the breast, forming part of a woman's attire.

Stomach Pump, a surgical apparatus for emptying the stomach, or injecting liquids, etc.

Stone, in England, a commercial weight varying with the article weighed, but legally 14 lbs. The stone of butcher's meat or fish is usually reckoned at 8 lbs.; of cheese, 16 lbs.; of hemp, 32 lbs.; of glass, 5 lbs. In Hamburg a stone of flax is 20 lbs.; of feathers, 10 lbs. The Prussian stone of 22 lbs. is equal to 22½ lbs. avoirdupois, 5 stone making 1 trade centner, of 110 lbs. = 113 lbs. avoirdupois, nearly.

Stone [Fr. *pierre;* Ger. *Stein*]. Building-stone is usually called *freestone*, probably because it yields freely to the action of the saw and chisel, which the harder granites do not; while, on the other hand, it is not so soft and friable as to crumble away quickly. The two chief classes are *limestone* and *sandstone*, each separable into many different kinds, which it would be useless to describe or enumerate here. A softer kind, *marble*, is largely used for more delicate purposes; while very hard *granite* is invaluable in great engineering operations.

Artificial Stone. — Hard cement is, in effect, artificial stone, and so are all kinds of concrete; but the name is usually confined to blocks of composition, capable of being used in that shape as substitutes for large squared stones. Ransome's *artificial stone* is one such kind. It consists of sand, gravel, pebbles, fragments of limestone or granite, or, indeed, of almost any stony substances, ground and sifted very fine, as the solid ingredients. The liquid vehicle is made by dissolving flint in a solution of caustic soda at high temperature and pressure. The solids are mixed with this liquid to a pasty consistence, and cast into any kind of hollow receptacle, whether a regularly shaped mould or not. After slow drying, the composition is steeped in a solution of chloride of calcium; a chemical reaction forms insoluble silicate of lime, which is retained, and soluble chloride of sodium, which is easily got rid of. The result is an artificial stone, fragments of real stone cemented by silicate of lime; a kind of flint glue impervious to moisture; it resists the atmosphere well, and is very hard and strong. Ransome's composition is moulded into paving-stones, filters, scythe-stones, and grindstones. By selecting finer or specially colored fragments to be mixed with the solution, capitals, columns, balustrades, mouldings, cornices, chimney-pieces, floorings, steps, and other kinds of ornamental stone-work are produced. Orsi's *artificial lava* is made of 3 parts stone or gravel, 2 parts pounded chalk, 1 part tar, $\frac{1}{16}$ part wax. The solid ingredients are added to hot melted tar, and the mixture is poured into moulds. Blocks, pipes, tubes, troughs, hollow vessels, and other articles are made of this substance. *Metallic lava* is a mixture of 2 parts ground flint, 3 broken marble, 1 resin, and small quantities of wax and coloring matter (to imitate sandstone, red granite, etc.). This is chiefly used for tessellated pavements. The pieces are made on a flat iron plate, and are ½ inch to 1 inch thick, backed up to any required thickness with plain brown lava. The mode of casting and joining the separate colored pieces or tiles depends on their shapes, and on the mutual arrangement of the several colors.

Stone-working. — When a block of any of the usual kinds of building-stone, such as limestone or sandstone, has been brought in a rough form from a quarry, it goes through many mechanical processes to fit it for use. The same is nearly the case for marble and for granite, with modifications due to the delicacy of the former and the hardness of the latter. The hand processes are chiefly conducted with the saw and chisel. The saw is an iron blade, blunt at the edge. It does not really cut the stone, but is the means of applying small particles of sharp sand, which act like the teeth of a fine saw. The sawing of stone by hand in a mason's yard is familiar to every one, — the to-and-fro motion of the blade, kept constantly wetted by sand and water. The hand-pick chips off protuberances; the chisel and mallet work down the surface to a rough level; while sand and emery enable two surfaces to grind and polish each other. The machine processes are far more interesting. In sawing a block into slabs, several saws are fixed parallel in a frame, at distances apart equal to the thickness of the slabs: one series of movements, governed by steam power, saws all the slabs simultaneously. In Dean Forest, pavement slabs are cut twenty or thirty at a time, by fixing a number of cutters on a large revolving disk or cylinder; 250 square feet of pavement, 1¾ inches thick, can be cut by one of these machines in ten hours. By another machine a series of chisel cutters follow each other along the same groove, being fixed to a frame

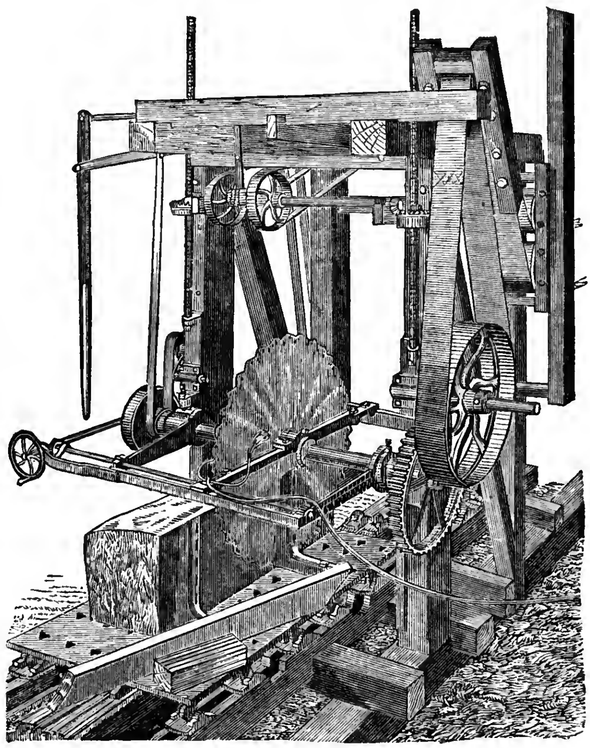

Fig. 460. — STONE-SAWING MACHINE.

travelling along a miniature railway. Small circular cutters, ranged parallel on an axis, are employed to cut up slabs into slips and fillets of various widths. The stone-sawing machine shown in Fig. 460, has only one circular blade in a frame, which may be raised or lowered, according to the required depth of cutting. Circular pieces, even cylinders and tubes, are cut by the aid of hollow cylindrical tools, and of cutters of various kinds, made to rotate. The shaping of mouldings is effected by grinding rather than cutting: iron patterns, having the proper curvatures given them, are made to rotate rapidly; the slab of marble is caused to pass slowly under them, and is ground down by the pressure of the iron, aided by moistened sand. To grind large slabs, a flat iron plate is used; both receive a kind of spiral motion, and the iron grinds away the stone or marble. Smaller pieces are ground by pressing them down upon a horizontal revolving cast-iron disk. The polishing is only a finer kind of grinding. See BLASTING, MASONRY, QUARRYING, etc. *Imp.* duty: freestone, granite, sandstone, and all other building and monumental stones, except marble, $1.50 per ton.

Stone-Breaker. See BREAKER (STONE), and MACADAMIZED ROAD.

Stoneware, a very hard kind of pottery, with which are made jars, drain-pipes, and a variety of chemical utensils. It is constituted of plastic clay, united in various proportions with some felspathic mineral sands of different kinds, and in some cases with cement, stone, or chalk. These mixtures are then subjected to a heat sufficiently great to cause a partial fusion of the mass. This condition of semi-fusion is the distinguishing character of *S.* The finer varieties of *S.* are made from carefully selected clays, which when burnt will not have much color. These are united with some fluxing substance, by which the particular state of semi-fusion above mentioned is brought about. *Imp.* duty: common, 25 per cent; above the capacity of 10 gallons, 20 per cent.

Stonington. See CONNECTICUT.

Stool, a low wooden seat on legs. — A carpenter's bench.

Stop Cock, a tap with a turning handle, to open or close the passage in a pipe. The stop-valves or water-mains usually slide against their seats, the operative device being a screw turned by a handle.

Fig. 188 (p. 376) represents one of the stop-cocks manufactured by Mr. John McLean, of New York, and now in general use in all our large cities. The advantages claimed for them are the reduction in height; the general compactness and quality of material and workmanship; and the accessibility of all the parts, which, being of corresponding sizes, are interchangeable.

Stoppage, an obstruction; a discontinuance of work; setting machinery at rest; a deduction made from pay or allowances to repay advances.

Stoppage in Transitu, the seizure by the seller of goods sold on credit, during the course of their passage (transitus) to the buyer. The transitus is defined to be the passage of the goods to the place agreed upon by the buyer and seller, or the place at which they are to come into the possession of the buyer. This definition does not mean that the term transitus implies continual motion; goods are in transitu while they are at rest, if they are still on the road to the place to which they have been sent. This doctrine of stoppage in transitu entitles a seller, in case of the insolvency or bankruptcy of the buyer, to stop the goods before they come into the buyer's possession. The right of stoppage in transitu is not confined to cases of buying and selling. A factor either at home or abroad, if he consigns goods to his principal by the order of the principal, and has got the goods in his own name or on his own credit, has the same right of stoppage in transitu as if he were the seller of the goods. Questions of stoppage in transitu sometimes involve difficult points of law.

The right of stoppage implies that the goods are in the possession of the seller or factor when he exercises this right. Accordingly, the law of stoppage involves the law of possession of movable things. If the buyer has in good faith and for value sold the goods, and indorsed and delivered the bill of lading, this second purchaser holds the goods free from the first seller's right to stop them. But if the goods and bill are transferred only as a security for a debt due from the first purchaser to the transferee, the original seller may stop the goods, and hold them subject to this security, and need pay only the specific advances made on their credit or on that very bill of lading, and not a general indebtedness of the first purchaser to the second. The question has been much agitated whether the right of stoppage in transitu was a right to rescind the sale for non-payment, or only an extension of the common-law lien of the buyer on the thing sold for his price. And it seems now quite well settled, both in England and in this country, that it is the latter; that is, an extension of the lien. Important consequences might flow from this distinction. If the seller, by stopping the goods in transitu, rescinds the sale, he has no further claim for the price, nor any part of it; nor can the buyer, or any one representing him, pay the price and recover the goods against the will of the seller. If, however, he only exercises his right of lien, he holds the goods as the *property* of the buyer; and they may be redeemed by him or his representatives by paying the price for which they are a security; and if not redeemed, they become absolutely the seller's, in the same way as a pledge might become his; and if he fails to obtain from them the full price due, he has a claim for the balance upon the buyer. All of this is not positively determined by adjudication, but it would seem to be deducible from the principle that the act of stoppage in transitu is only the exercise of a lien on the goods for their price.

Storage, a charge for warehousing goods. See WAREHOUSE.

Store, a general warehouse; a retail shop; a place where goods are exhibited and sold, whether at wholesale or retail. In England, where goods are sold at retail, the place is called a *shop;* in the U. States, a store. — To lay up; to stock.

Storekeeper, a retail dealer; generally one who keeps a miscellaneous assortment of all kinds of commodities. — An officer of the customs placed in charge of a U. States bonded warehouse.

Stores, necessary articles accumulated or laid up for future use; supplies of different articles, provided for the use of the crew and passengers of a vessel; as, ship *stores*, cabin *stores*, etc.

Stout. See BEER.

Stove, a close fireplace for warming apartments, offices, etc. *S.* in the U. States are of great diversity of forms, of cast iron, sheet iron, and sometimes of soapstone; while iron *S.*, especially for burning coal, are commonly lined with fire brick, which not only increases their durability, but prevents the metal from being over-heated. The desirable points in *S.* are self-acting contrivances to regulate the draught, accurate fitting of all parts, enclosure of the fire space with slow conductors, and the bringing of all the heated products of combustion in contact with the largest possible absorbing and radiating surface, so that the iron will give out its warmth at a low temperature.

Stove-Polish, black-lead.

Stow, to arrange, to lay up; to pack cargo.

Stowage, the proper arrangement in a ship of the different articles of which a cargo consists, so as to prevent injury by friction or by the leakage of the vessel.

Straighten, to level or smooth; to plane.

Strainer, a cullender or sieve. — A tool for laying down carpets. See CARPET STRAINER.

Strait-Jacket, a waistcoat or bandaged garment for confining a lunatic, to prevent his injuring himself or others.

Strake. See PLANKING.

Stramony, the thorn apple, *Datura stramonium*, a medicinal plant of poisonous properties.

Strand, the sea-shore. — A division or twist of a rope; an aggregation of yarns from 15 to 25 twisted together, three strands being spun into a rope, and three ropes making a cable.

Stranding, the running of a ship on shore, or on the beach.

In recovery of losses from underwriters, it is often a question of material consequence, whether the vessel was or was not "stranded," according to the legal meaning of the term. To constitute stranding, it is not sufficient that the vessel has struck, if she has been speedily got off, however much she may be injured. If the ship be forced aground, and remain for any time stationary, whether it be on piles, on the muddy bank of a river, or on rocks on the sea-shore, provided there be a settlement of the ship, so that the voyage is actually interrupted, that is a stranding, without reference to the degree of damage she sustains.

Strap, a narrow leather band or long strip of anything, used as a fastening.

Strass, a colorless, easily fused, soft, and very refractile kind of glass, used in the manufacture of artificial gems. — The waste or refuse of silk in working it up into skeins.

Straw, the stalks or culms on which corn and other grasses grow, and from which the grain has

been threshed. *S.* is cut into chaff for feeding cattle and other purposes, and used as a litter. Some *S.* is plaited into braids for hats and bonnets; and artificial flowers, mats, and baskets are made of it; it is also twisted into *S.* ropes, and cigar-cases. See HAT (STRAW), and PAPER (STRAW). — The value of manufactured *S.* (including palm-leaf) imported into the U. States during the year 1879, chiefly from France, China, England, and Italy, was $2,568,679.

Imp. duty: unmanufactured, free; twisted for forming braids, etc., 20 per cent; braids, plaits, etc., 30 per cent; hats, 40 per cent; manuf. of straw, n. o. p. f., 35 per cent.

Strawberry, an esteemed and choice fruit, a species of *Fragaria*, largely cultivated as a table fruit, and for making jam.

In New York the *S.* season usually covers one fourth of the year. On or about the 10th of April, packages of berries are received by the Charleston steamers. The shipments from Rochester and Wayne, St. Lawrence and Niagara Counties, in New York, last till the 20th of July. Beginning at the southern margin of the U. States, and closing with the growth of Upper Canada, the extremes of the season take in a hundred days. In a commercial sense the business commences in the middle of April, continues to increase till the 10th or 15th of May, when, having reached its maximum, it remains at that point till the 20th to 25th of June. It then decreases quite rapidly till the middle of July, when the *S.* time is virtually over. The amount of *S.* annually shipped from Norfolk, Va., to New York is 1,500,000 quarts; from Delaware Peninsula, 3,000,000 quarts. The *S.* trade from New Jersey, including those sent to the Philadelphia and New York markets, reaches nearly 2,000,000 quarts, and the *S.* raised on the Hudson River and sent to New York City and Boston amount to 1,000,000 or 2,000,000 quarts more. So that there is an aggregate of *S.* raised within a reach of 500 m. of 7,000,000 to 10,000,000 quarts yearly. It costs about $500 to every acre to lay out a S. bed, and it takes a capital of $150 to every acre for crates and baskets alone. One hundred dollars to an acre is regarded as a satisfactory return on the capital invested. Norfolk *S.* are only fit for shipment when cool; if it is a warm day when they arrive there they soon wilt. The largest portions that arrive in New York go out of the city, and are shipped to different points, — Boston, Hartford, New Haven, etc. When Delaware *S.* arrive, Norfolk fruit declines in price.

Straw Bonnets. See HAT (STRAW).

Straw Color, a light yellow color.

Straw Cutter, a chaff-engine; a machine with knives for chopping straw for horse-provender.

Straw Plait, a strip made by plaiting straw, and used for making bonnets, hats, etc. See HAT (STRAW).

Stray, an animal found wandering and unclaimed.

Streak, STRAKE, a range of planks running fore and aft on a vessel's side.

Stream-Anchor, a lighter anchor than the bower-anchor, but larger than the kedges.

Stretch, to draw out or lengthen; to extend.

Stretcher, a thin piece of wood placed across the bottom of a boat, for the oarsman or rower to rest his feet against. — An instrument for easing boots or gloves; a closing bed-frame.

Strickle, an instrument used in moulding pipes. — A stick to strike off the surplus from a heaped measure. — A scythe whetstone.

Strike, a means adopted by workmen in order to obtain higher wages or some amelioration in their working circumstances, and in which they leave their work in a body and refuse to resume it until their demands are complied with. Such proceedings are always attended with great hardships, and usually give rise to much bad feeling on both sides. The object of the workmen evidently is to force their employers into compliance by taking advantage of their necessity to have the work carried on or completed, and the knowledge of this naturally makes the employers the more inclined to resist. Perhaps, however, the chief objection to strikes is the all but impossibility of their being carried out without a system of tyranny being maintained towards a number even of those who are parties to it. A strike without unity among a number of workmen is a failure; and to obtain this, usually a number of persons are forced into it most unwillingly. A strike, so long as there is no destruction of property or intimidation, is perfectly legal, but it often degenerates into a lawless mob.

Strike-Block, a plane shorter than a jointer.

String, small cord. — The wires or gut of a musical instrument. — A row or thread of beads.

Stringed Instrument, a musical instrument whose tones are produced by the vibration of strings.

Stripes, a heavy twilled cotton fabric, woven in narrow stripes of indigo blue and white, used for shirts for laborers.

Strip-Leaf, tobacco from which the stalks have been removed before packing in the hogshead.

Stroke, the sweep of an oar: the movement of a piston.

Strontia, the protoxide of strontium, an alkaline earth very similar in character to baryta. It gives a red color to flame, and is therefore used for fireworks, in theatres, etc. *Strontium* is a very light mineral, only $2\frac{1}{2}$ times the weight of water; ductile, malleable, pale-yellow, a little harder than lead. It burns with a crimson flame when heated in the air.

Imp. duty: Acetate or pyrolignite, 25 cts. per lb.; muriate and nitrate, 20 per cent.; oxide or protoxide, free.

Strop, a strip of leather used for sharpening razors, and giving them a fine, smooth edge.

Strychnine, STRYCHNIA, a powerful alkaloid, obtained from species of the *Strychnos* or the *nux vomica* bean; a valuable but very dangerous poison. As usually kept in the shops, it is a white or grayish white powder. *Imp.* duty: $1 per oz.; its salts, n. o. p. f., $1.50 per oz.

Stucco. See CEMENT, and PARIS PLASTER.

Stubtail, STUMPTAIL, flour made out of damaged wheat and good wheat ground together.

Stud, an ornamental knob or boss. — An ornamental button for a shirt-bosom.

Stud-Bolt, a double-threaded bolt to be screwed into a fixed part at one end, and receive a nut upon the other.

Studding-Sails, extra sails set outside the regular square sails in fine weather, on booms run out for the purpose.

Study, a painter's preliminary sketch for a finished work; a draught copy for improvement.

Stuffing-Box, in a locomotive engine, a box with a recess for admitting some soft material, such as white spun yarn, to render steam-tight any rod working through this stuffing or packing.

Stum, grape-juice or wine that has not fermented; this is frequently mixed with vapid wines to renew fermentation.

Stump, a stub or root block; the root of a tree left in the ground (Fig. 461). An artist's soft pencil or rubber.

Sturgeon, the name of cartilaginous fishes, composing the genus *Acipenser*, family *Sturionidæ*. The common *S.*, *Acipenser sturio*, is generally 6 ft. long, but sometimes attains the length of 18 ft. It inhabits the North American and European seas, migrating during the early summer months into the larger rivers and lakes, and returning to the sea again in autumn, after having deposited its spawn. Its form is long and slender, gradually tapering towards the tail, and covered throughout the whole length by five rows of strong, large, bony tubercles, rounded at the base, and terminated above by a

sharp, curved point, in a reversed direction. The mouth, placed under the elongated muzzle, is small and toothless; and the palatal bones form the upper jaw; the air-bladder is very large, and from it the isinglass of commerce is prepared. In North

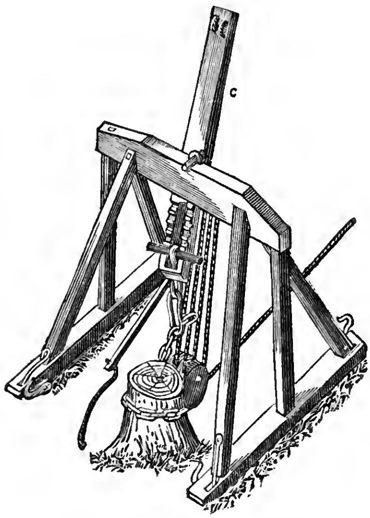

Fig. 461. — Stump-Extractor.

America they appear in great abundance during the early summer months. The flesh of the *S.* is white, delicate, and firm; it is generally eaten pickled. From the roe, when properly salted and dried, is prepared the substance known by the name of *caviare;* a very superior sort is made from a smaller species, called the *Sterlet.* See Sterlet. The sharp-nosed *S.*, *A. oxyrhynchus*, of the Atlantic coast of N. America, is from 4 to 8 ft. long.

Stuyvesant Insurance Co., a fire-insurance Co., located in New York City, organized in 1851. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $137,084. Risks in force, $12,633,570; premiums, $46,734. Premiums received since the organization of the Co., $1,819,000; losses paid, $717,228; cash dividends paid to stockholders, $580,000.

Style, a hard bone or metal-pointed pencil, for writing on tracing or copying paper, on waxed tablets, or for graving with.

Stylish, fashionable, elegant.

Styptic, an astringent medicine, having the quality of stopping bleeding.

Sub [Latin], under, less; a prefix to words expressing a depute agent.

Sub-Contractor, one who takes a portion of a contract for work from the chief or principal contractor.

Sub-Editor, an assistant editor of a periodical or journal.

Sub-Let, to under-let a tenement.

Sublimate, to refine; to volatilize substances by heat, and again condense in a solid form by cooling the product so refined.

Submarine Telegraph. See Telegraph.

Submerged, put under water.

Subscriber, one who enters his name for one or more copies of a book, periodical, or serial; or as a member, etc.

Subscription, a contribution given; the writing or signature appended to a deed or document.

Subsidence Vat, a dyer's settling-vat.

Substitute, a deputy; one acting for another.

Subvention, a government grant or aid; a subsidy.

Succedaneum, a substitute.

Succinic Acid, an oil first obtained from amber by distillation, but now obtained from wormwood, malic acid, etc. It is used in metallurgy. *Imp.* free.

Succory. See Chicory.

Succulent, full of juice.

Sucker, a piston; a piece of leather in the box of a pump. — The off-shoot of a plant.

Sucking-Bottle. See Feeding-Bottle.

Sucking-Pump, a pump where the water is raised into the barrel by atmospheric pressure.

Suds, water impregnated with soap, for washing or scouring.

Suet, the hard, solid fat, near the kidneys of oxen and sheep.

Suez Canal, a maritime or ship-canal, which crosses the isthmus of that name, and forms part of the new trade-route between Europe and the East. On the Mediterranean, in lat. 31° 3′ 37″, it joins Port Said, a town which, founded about half a score of years ago, in a dreary, arid waste, contains now nearly 1,000 houses and a cosmopolitan pop. of about 10,000. On the Red Sea, in lat. 29° 58′ 37″, the terminus of the canal, is Suez, which was formerly a most miserable-looking place, but now a thriving seaport-town, with a pop. of about 6,000. Half way across stands the newly made city of Ismaïlia.

Fig. 462. — Railroad Station at Isma'ilia (Isthmus of Suez).

The length of the canal is 160 kilomètres, or 100 m., more than one half of which is nearly 8. Its breadth varies at the surface from 325 ft. to 195 ft.; the banks sloping from a floor of 72 ft. wide in the proportion of 2 to 1, up to 5 ft. of the surface, and thence as 5 to 1; the latter slope permits the waves of passing vessels to break on the banks as smooth as on a sea-beach. Depth, 24 ft. Vessels measuring 430 ft. in length, and drawing 25 ft. 9 in. of water have passed safely through the canal. As a work of engineering, the canal ranks with the greatest triumphs of our age. It was built by the Suez Canal Co., on the plans and under the direction of the great French engineer, Ferdinand de Lesseps. Begun in 1859, it was opened for navigation Nov. 27, 1869. Its actual cost, according to a report of the year 1877, was $87,593,645, exclusive of $6,800,000 bonds issued to pay for coupons on shares in arrears during part of the period of construction. The number and tonnage of vessels which passed through the canal in each of the 8

years from 1870 to 1877, and the receipts of the Co. from transit dues on ships, were as follows: —

Years.	Vessels.	Vessels.	Receipts.
	Number	Tonnage	$
1870	491	436,618	1,031,860
1871	761	761,875	1,798,740
1872	1,082	1,439,169	3,281,520
1873	1,171	2,085,270	4,779,460
1874	1,264	2,423,672	4,971,870
1875	1,496	2,940,708	5,777,260
1876	1,461	2,095,870	5,994,995
1877	1,651	2,251,556	6,154,870

Rather more than ¾ of the shipping that passed through the Suez Canal in the eight years, 1870-77, belonged to Great Britain. In the year 1877, there passed through the canal 1,291 British vessels, 85 of France, 63 of the Netherlands, 58 of Italy, 46 of Austria, 41 of Germany, and 21 of Spain, the remainder, 46 in number, being distributed among seven other nationalities. The total receipts, from all sources, of the Suez Canal Co., amounted to 33,975,648 francs, or $6,795,130, and the total expenditure to 29,238,721 francs, or $5,847,745, in the year 1877. In the year 1876, the total receipts were 30,827,194 francs, or $6,165,440, and the expenses 17,798,408 francs, or $3,559,680. The first year in which the receipts exceeded the expenses was 1872, when the surplus amounted to 2,071,279 francs, or $414,245.

Suffolk Cheese. See Cheese.

Sugar [Fr. *sucre;* Ger. *Zucker;* It. *zucchero;* Port. *açucar;* Sp. *azucar*], a sweet, granulated substance, too well known to require any particular description. It is everywhere in extensive use, and in this country ranks rather among the indispensable necessaries of life than among luxuries. In point of commercial importance, it is second to very few articles. It is procured from many plants, as maple, beet-root, birch, parsnip, etc., and exists in all vegetables having a sweet taste, but is obtained chiefly from the sugar-cane, *Saccharum officinarum,* which contains it in greater quantity than any other plant. It is one of the largest of the grasses, growing from 8 to 12 ft. in height, and acquiring a diameter of 1 to 2 in.; the sugar being contained in the loose, cellular, juicy pith with which the stalk is filled. It thrives from the equator to the 32d degree of latitude. The cultivation of this plant is principally confined to the West Indies, Venezuela, Brazil, Mauritius, British India, China, Japan, the Sunda, Philippine, and Hawaiian Islands, and to the southern districts of the U. States. The varieties most cultivated in the latter are the striped blue and yellow ribbon, or Java; the red ribbon, or violet, from Java; the Creole crystalline, or Malabar; the Otaheite, the purple, the yellow, the purple-banded, and the gray canes. The cane is always propagated by cuttings; it is a plant which quickly exhausts the soil, and unless manure is used, the land is fallowed, or the crop forms part of a rotation, the soil is soon run down. The sugar-cane was cultivated for the first time in this country in about 1751, near the site of New Orleans, by some Jesuits from San Domingo; and the first sugar mill was built, a little further down the river, in 1758, by Mr. Dubreuil. Soon after the Revolution, a large number of enterprising adventurers emigrated from the U. States to Lower Louisiana, where, among other objects of industry, they engaged in the cultivation of cane, and by the year 1803 there were no less than 81 sugar estates on the Delta alone. Since that period cane sugar has been one of the staple products of Louisiana (see table of production for 20 years, under New Orleans); but the production has considerably declined since the civil war.

This great decline is due to several causes: First, the effects of the war so changed the relations of labor that a corresponding change took place in the manner of carrying on the estates, and many were abandoned or neglected. It is an open question still whether capital will be invested in the same manner as in former times; many, and some of the most intelligent, planters believe that in time this great industry will be revived under a system of small farms and central factories, where the cane will be sold or ground on shares. This plan has the merit of allowing men of small means to combine and erect a sugar-house jointly, or will induce men other than planters to put their capital into a business that will be entirely separate from the planting, and not subject to the same vicissitudes as when connected with the agricultural branch of the business of sugar-making. The great objection to this plan, viz., the transportation of the cane, which is very heavy, from divers farms, can and will be obviated by better roads, or by location in favorable bayous, so that transportation by boats can be made as cheaply as by carts now. But another great drawback exists in the state of the levees to protect the lands from overflow. Formerly, when our production was nearly one half our consumption, the State of Louisiana, which is the great centre and real producer of our sugar crop, was tolerably well protected; but the wear and tear of war left the State in a sad condition, both as regards levees and finances. It is useless to hope that private enterprise will accomplish a work of such magnitude. A private citizen can at great expense protect his river front or levee; but suppose his neighbor is unable to protect his equally well, the neglect of his neighbor, yes, neighbors for miles, will visit him with as great a loss as would have resulted from his own neglect. The sugar estates of Louisiana are generally located on the Mississippi River, beginning some 60 m. below New Orleans, and going some 200 m. above. There are also many estates in the parishes or counties to the W. of the river; in fact the greater portion of the State S. of the Red River, and W. of the Mississippi, is good sugar land. Yet of this immense area only 150,000 acres, or the area of one half of a county, is planted in cane. The yield per acre is from 1,600 lbs. to 3,000 or 4,000 lbs. of sugar, and a proportionate quantity of molasses. The crop of sugar is subject to no more, if as many, vicissitudes as the other staple crops of the country. No greater illustration of the value of the crop can be given than the single fact that the product of only 150,000 acres is so great as to be considered of national importance. It is only by such a comparison that we can realize the great possibility of our sugar lands when the subject shall receive the attention it deserves from the government. In the State of Texas there are large bodies of land eminently suited to growing sugar-cane. In 1878 the crop was estimated at 6,000 hogsheads, with the prospect of a large increase. In Florida, also, there is an almost unlimited breadth of land suited by climate and soil to the culture of sugar.

The following table of consumption of sugar in the U. States for the 20 years from 1860 to 1879, is compiled from governmental and commercial reports, by adding to the imports of each year the amount left over from the previous year, and deducting the surplus at the close. To this is added a reliable estimate of the amount of domestic sugar and molasses produced within the year, deducting the quantities exported. This process gives a close approximation to the actual consumption, in tons of 2,240 lbs. The importation of sugar and molasses on the Pacific coast is not given by the above authority, and cannot be made out from the Treasury reports in calendar years, for the reason that these reports conform only to fiscal years. Local statisticians at San Francisco give the importations for 3 years, omitting fractions, as follows: 1877, 30,003; 1878, 34,346 tons; 1879, 32,022 tons.

Years.	Total consumption.	Imported.	Domestic.
	Tons.	Tons.	Tons.
1860	415,281	296,250	119,031
1861	363,819	241,420	122,399
1862	432,411	241,411	191,000
1863	284,308	231,398	52,910
1864	220,660	192,660	28,000
1865	350,809	345,809	5,000
1866	391,678	383,178	8,500
1867	400,568	378,068	22,500
1868	469,533	446,533	23,000
1869	492,899	447,899	45,000
1870	530,692	483,892	46,800
1871	633,314	553,714	79,600
1872	637,373	567,573	69,800
1873	652,025	592,725	59,300
1874	710,369	661,869	48,500
1875	685,352	621,852	63,500
1876	638,369	561,369	77,000
1877	666,194	577,194	89,000
1878	684,896	613,896	71,000
1879	743,174	631,174	112,000

The receipts of foreign sugar in the ports of the U. States (exclusive of California and Oregon), for the year 1879, were as follows: —

Received at	Tons of 2,240 lbs.
New York	480,548
Boston	124,146
Portland, New Haven, etc	8,191
Philadelphia	58,980
Baltimore	7,153
New Orleans	2,628
Other Southern ports	397
Total receipts	682,043
Add stock at all the ports (Jan. 1, 1879)	53,176
Total supply	735,219
Deduct exports to Canada	2,612
	732,607
Deduct stock at all the ports (Jan. 1, 1880)	61,572
Total consumption of foreign sugar in 1879	671,035

The following table shows the quantity and value of *brown sugar* imported into the U. States, by countries, for the year 1879: —

Imported from	Pounds.	Dollars.
Belgium	2,253,786	114,606
Brazil	63,380,355	2,274,450
Central American States	3,640,174	155,108
Danish West Indies	4,899,559	186,054
French West Indies	70,551,547	2,554,736
England	4,030,831	173,628
British West Indies	33,415,713	1,184,933
" Guiana	13,074,378	480,782
" East Indies	3,499,852	119,701
Dutch East Indies	47,415,776	1,992,975
San Domingo	7,922,211	291,886
Spanish possessions: Cuba	1,275,836,966	50,732,600
" " Porto Rico	84,704,473	3,120,960
" " others	112,450,478	3,895,398
All other countries	14,574,390	542,334
Total	1,741,650,489	67,820,101

Our imports of *refined sugar* for the same year was 130,552 lbs., valued at $8,656. — The yearly average price in New York of fair to good refining Cuba sugar per 100 lbs. and for 5 years was: 1875, $7.97; 1876, $8.48; 1877, $8.89; 1878, $7.25; 1879, $6.93.

Our exports of refined sugar for the year 1879, chiefly to Great Britain and Canada, were 72,309,009 lbs., valued at $6,164,024.

The consumption of cane and beet sugar for all Europe, for 5 years, was: 1875, 1,527,924 tons; 1876, 1,632,932 tons; 1877, 1,581,727 tons; 1878, 1,723,401 tons; 1879, 1,815,438 tons. The sugar product of the world is not increasing as fast as the demand. The amount consumed per capita is each year increasing; the amount consumed per capita in this country is larger than in any other, and is estimated at nearly 40 lbs. Besides this there is a large consumption of cane-molasses, sorghum, and maple sirup.

Manuf. — The following are the chief processes by which sugar is produced in establishments provided with well-made machinery of the most recent kinds. When the cane is ripe for cutting, which in Louisiana begins towards the end of August, the stem is of a straw-yellow color, and the juice or sap has become sweet. The plants are cut down near the ground, tied up in bundles, and carried to the crushing-mill. All the arrangements are made for operating on the juice as soon as the canes are cut, otherwise it would ferment and spoil. The fresh juice contains about 20 per cent of its weight in good sugar; but the planter seldom gets more than 10 or 12 per cent, owing to the hasty and clumsy nature of the processes. It is always by pressure that the juice is expelled from the canes; and the mill employed for this purpose is a very powerful machine (Fig. 463), with iron rollers of great weight. The canes are carried forward by a self-feeding apparatus, split, slightly pressed by one pair of rollers, and heavily pressed by another pair. The juice, which runs down in a continuous stream into a vessel prepared to receive it, is opaque, and of a yellowish green. About 60 lbs. of it are obtained from 100 lbs. of cane by the very efficient apparatus now employed; but the state of the atmosphere somewhat affects this ratio. Another estimate is, 1 hogshead of sugar from 1,500 gallons of juice, the produce of 13 tons of cane. There are sugar-mills of great size and power, with rollers 6 ft. long and 30 in. diameter, capable of pressing out 3,000 gallons of juice per hour. Even this magnitude has been exceeded in a sugar-mill with rollers 7 ft. long, 33 in. diameter, weighing 10 tons with the shaft and gudgeons, and pressing out 4,000 gallons per hour. Some of the mills have three, four, and even five rollers. The juice contains a large amount of water, and of impurities which must be removed before granulated sugar can be obtained; not more than 20 per cent is real sugar, and much less than this of sugar that can be crystallized. By rapid boiling in vessels heated by high-pressure steam, the water is driven off without affecting the general qualities of the juices; but by slow and long-continued boiling, certain changes are produced which are not conducive to excellence of results. Most of the water having been driven off, the juice goes into the *clarifier*. This is a very large copper vessel, heated by steam-pipes coiled round near the bottom. Salts of lead, sulphurous acid, and other substances have been employed to clarify; and there are frequent novelties introduced into this part of the manuf. The result is, that sediment and scum are removed, and the juice flows as *sirup* into a receiving vessel. By one stage after another, the sirup changes its form into granulated sugar. The *concreter* is a machine which has a series of shallow iron trays, so placed that the sirup can flow in a continuous stream from one to another; all the trays are highly heated, and the sirup boils as it travels along. Hence it passes into a very long copper cylinder, where, being rotated six times a minute over heat, and being supplied with a kind of hot-blast within, the sirup becomes thicker, or more glutinous and concreted, every minute. The apparatus produces about 2 lbs. of concreted sugar from 1

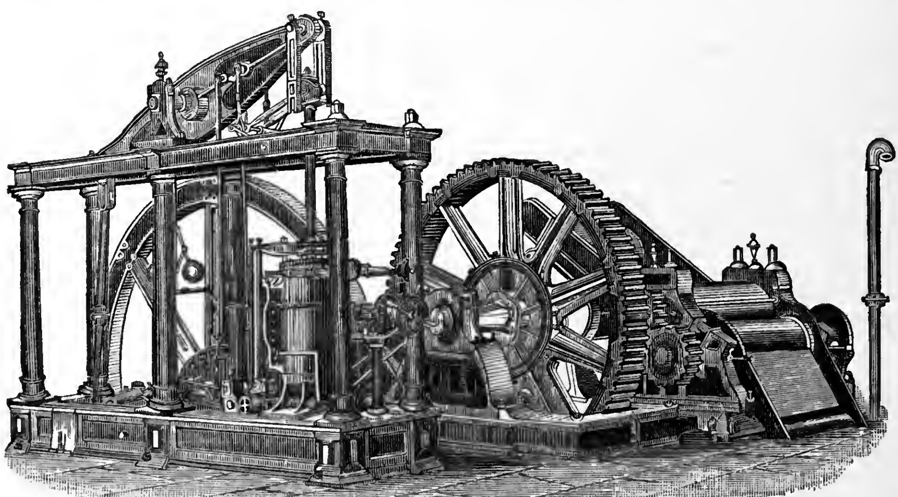

Fig. 463. — Sugar-Mill.

gallon of sirup. The concreted sugar passes into a *vacuum-pan*, where it is exposed to a rapid boiling at about 150° F. This could not be done under ordinary arrangements, because sugar requires a temperature of 230° F. to boil; but by creating a partial vacuum in the pan, through the action of an air-pump, the desired result is brought about. Great advantage is thus derived; for the overheating of the sugar is averted, while at the same time that kind of concentration is insured which can only result from boiling. Some vacuum-pans are made as large as 8 ft. diameter, boiling 80 tons of sugar in 24 hours. The modern apparatus for granulating and drying the sugar is a great improvement on that formerly in use. The mass flows into a *centrifugal machine* which rotates 1,000 times a minute. It consists of crystals of sugar entangled in a mass of molasses; the crystals are retained in the inner case of the machine, while the molasses is driven through a series of small holes into an outer case. This is soon accomplished, owing to the rapid action of the machine. The sugar in this state constitutes *raw* or *muscovado sugar*; it is fine enough to be used for ordinary purposes, without further processes. The molasses, subject to further treatment, yields coarser sugar, and finally the well-known sweetener, *treacle*.

Refining. — A sugar refinery receives the sugar already brought to a granulated state, and really as sweet as it is ever likely to be. The object in view is to remove all color from it, and (usually) to bring it to the form of a compact crystalline mass, with which we are familiar under the name of *loaf* or *lump* sugar. Processes of a peculiar character are required for this purpose. Not only, however, are refined loaves of sugar made, but also *crystal* sugar and *crushed* sugar, which are nearly white without being agglomerated into masses. The chief operations in a sugar-refinery are as follows: The sugar, emptied out from the hogsheads, cases, or bags, is dissolved in hot water in large cisterns. Water enough is added to produce a sp. gr. of about 1.25, or 29° Baume. By a large pump near each cistern at the same level the solution is drawn off through a connecting pipe provided with a coarse wire strainer, which prevents all except the smaller solid particles from entering the pump. The saccharine solution is pumped up into the highest story, which is usually the seventh or eighth, it being cheaper as well as more convenient to elevate the sugar in solution than in a solid state. It is pumped into vessels called *blow-up pans*, because steam was formerly blown into them to heat them. They are now heated with close coils to about 208° or 210° F. Milk of lime is added to the solution in these pans, for the purpose of neutralizing any acid which it may contain. From these pans the sirup passes down to the next floor and into bag-filters by which it is completely deprived of all suspended solid particles. After leaving the bag-filters, which it does at a temperature of from 170° to 180°, the sirup is run through filters of animal charcoal or bone black. These are immense cylinders, 6 or 8 ft. in diameter and usually from 20 to 25 ft. high, filled with pulverized bone-black, which substance has the property of absorbing all the coloring matter in the sirup, which runs from the bag-filters of a sherry-wine color. The sirup which runs from the *charcoal-filters* at a temperature of about 150°, and, in a perfectly colorless condition, is now pumped into *vacuum-pans* and concentrated to the granulating or crystallizing point. These vacuum-pans are large conical or ovoid vessels heated by steam and exhausted with air-pumps, by which the air and vapor are rapidly removed. In the later stages of the process the pressure is reduced to only 3 in. or less of mercury. As soon as crystallization begins the sugar is run off, and if it is to be made into soft sugar, the sirup is discharged by means of centrifugal mills. If it is for hard sugar, it is run into a vat which has a gate in its bottom; from this it is run into conical moulds placed upon carriages, which are drawn under the gate. In the bottom of each mould there is an orifice which is kept closed by a stopper for several hours, until the sugar crystallizes, when it is removed and the sirup allowed to drain away. The loaf which remains has a slight yellow tint, which is removed by allowing a colorless solution of sugar to pass through it. The loaves are then taken out of the moulds and dried in ovens at a temperature of about 160°. The portion of the sirup which will not crystallize is allowed to trickle out of the small end of the mould; it constitutes *treacle*.

Imp. duty: Cane, 10 per cent; cane slips, 20 per cent. — All sugars not above No. 7, Dutch standard in color, 1¾ cts. per lb.; above No. 7, and not above No. 10, 2 cts. per lb.; above No. 10, and not above No. 13, 2¼ cts. per lb.; above No. 13, and not above No. 16, 2¾ cts. per lb.; above No. 16, and not above No. 20, 3¼ cts. per lb.; all above No. 20, 4 cts. per lb. — Refined, loaf, lump, crushed, powdered, pulverized, or granulated sugar, 4 cts. per lb. — Refined sugar, when tinctured, colored, or adulterated, valued at 30 cts. per lb. or less, 15 cts. per lb. — Sugar-candy valued above 30 cts. per lb., and all other confectionery, sold by the box, package, or otherwise than by the lb., 50 per cent. — Sugar-candy, not colored, not sold otherwise than by the lb., not valued above 30 cts. per lb., 10 cts. per lb. — All other confectionery, n. o. p. f., made wholly or in part of sugar, and sugars after being refined, when tinctured, colored, or in any way adulterated, valued at not over 30 cts. per lb., and not sold otherwise than by the lb., 15 cts. per lb. — Sirup of sugar, and sirup of cane-juice, melado, concentrated melado, concentrated molasses, tank-bottoms, and tank-footing, 1¼ cts. per lb.

For further information, see BEET, MAPLE, MOLASSES, CANDYING, TREACLE, etc.

Sugar-Candy, crystallized or clarified sugar. See CANDY and CANDYING.

Sugar-Loaf, a conical mass of white sugar, which has been shaped in a pot, and refined and baked.

Sugar-Machinery, the rolling mills necessary for squeezing out the sap of the sugar-cane.

Sugar-Mill. See SUGAR (MANUF.).

Sugar of Lead, the acetate of lead, a very poisonous compound of acetic acid and oxide of lead, much used in calico-printing. *Imp.* duty: brown, 5 cts. per lb.; white, 10 cts. per lb.

Suit, a set of the same kind of things; a set of wearing apparel. — A law process or action.

Sullage, a founder's name for metal scoria or slag.

Sulphate, a salt formed by the union of sulphuric acid with a salifiable base. The sulphates are an important class of salts, most of which are noticed under their popular commercial names.

Sulphur, BRIMSTONE [Fr. *souffre*; Ger. *Schwefel*; It. *zolfo*; Sp. *azufre*], an elementary, combustible, solid, non-metallic substance, of a peculiar yellow color, and very brittle. It has neither taste nor smell, though when rubbed it has a faint, peculiar odor. Sp. gr. after being fused, 1.990. When pure it is bright-yellow, and very inflammable, burning with a clear blue flame, and leaving no residuum. It is an abundant product of nature, especially in volcanic districts; and in other places exists in combination with oxygen and sundry metals. It occurs in various forms. Native sulphur, largely imported from Sicily, is in square or oblong masses or blocks, called *rough brimstone*. Stick or *roll sulphur* is chiefly obtained from sulphuret of copper. Sublimed sulphur, or *flowers of sulphur*, is a fine crystalline bright-yellow powder, obtained by condensing the vapor of sulphur rapidly in capacious receivers. *Refined sulphur* is that purified by distillation in an iron still, and condensed in an iron receiver kept cool by water. Sulphur is employed for making gunpowder, sulphuric acid, and for a variety of other purposes in the arts; it is also employed in medicine. Our imports of crude sulphur or brimstone for the year 1879 (almost wholly from Sicily) amounted to 65,919 tons, valued at $1,487,698. *Imp.* duty: crude sulphur or brimstone, free; flowers of sulphur, $20 per ton, and 15 per cent.

Sulphuret, a combination of sulphur with a single base.

Sulphuric Acid [Fr. *acide sulfurique*; Ger. *Schwefelsäure*], when pure, is a colorless, oily fluid, acrid, corrosive, and intensely sour; and consists of three equivalents of oxygen, one of sulphur, and one of water. When as pure as usually prepared, it is of the sp. gr. 1.847. There is perhaps no substance more abundantly employed in the arts and manufactures. It is used in medicine; it is employed by bleachers for souring the cloth; by dyers for dissolving their indigo; by calico-printers; by brassfounders, button-makers, gilders, and japanners, for cleaning the surface of the metals with which they work; and by hatters, tanners, paper-makers, and many others. It is also used extensively in many chemical manufactures. *Imp.* duty: fuming sulphuric acid (Nordhausen), 1 ct. per lb.; other, free.

Sumach [Fr. *sumac*; Ger. *Schmack*; It. *sommacco*; Sp. *zumaque*], a shrub, *Rhus coriaria*, which is a native of Persia and Syria, as well as the S. of

Europe. Its shoots, after being cut, dried, and reduced to powder, are used for the purpose of dyeing and tanning. Of all astringents it bears the greatest resemblance to galls. It is considered of good quality when its odor is strong, color of a lively green, well ground, and free from stalks. The best is the Sicilian, which contains 30 to 35 per cent of tannin, and was formerly largely imported. It is now almost entirely replaced in this country by the stag's horn sumach, *R. typhina*, which is not so rich in tannin, but grows very abundantly in the wild state in the S. States, and especially in Virginia, where it is dried and reduced to powder as the Sicilian sumach. The principal seat of this industry is at Richmond. Sumach is used for tanning light-colored leather, and in dyeing and calico-printing; it yields with different mordants a great variety of tints.

Sumatra, the most W. island of the Indian Archipelago, and, next to Borneo, the largest in the E. seas, between lat. 5° 40′ N. and 5° 55′ S., lon. 95° 20′ and 106° 5′ E. It is separated on the N. E. from the Malay Peninsula by the Straits of Malacca, and on the S. E. from Java by the Straits of Sunda, having E. the Sea of Java, and surrounded on nearly all the other sides by the Indian Ocean. It is of an elongated shape, about 1,050 m. in length, greatest breadth, 250 m.; area 150,000 sq. m. The coast is about 2,500 m. in circuit. A range of lofty mountains, 15,000 ft. high, traverse the island on its W. side, while vast plains, watered by immense rivers, stretch to the E. The climate varies according to the elevation of the land, from the scorching plains of a tropical region to the freezing cold of an arctic latitude. Rice, sugar, betel, cocoa-nut, millet, coffee, sago, all kinds of spice and pepper, grow profusely, while tobacco and the cotton plant are generally cultivated. The mineral wealth of *S.* is remarkable, gold being extensively found, as well as iron, tin, copper, sulphur, and a large number of precious stones. Pop. perhaps 4,000,000.

The soil of *S.* is remarkable for its fertility, but agriculture is in a very rude state. The trade is principally carried on with Java, Madura, Singapore, Malacca, and British India. The chief exports are pepper, gold dust, camphor, nutmegs, cloves, mace, benzine, gutta-percha, copper, tin, sulphur, and coral. About three quarters of the island belong to Holland. Padang, the seat of the Dutch government for the W. coast of the island, has a considerable export of coffee to the U. States. It is a town of about 10,000 inhabitants, situated near the sea, in lat. 0° 48′ S., lon. 100° 20′ E.

Sump, a pit sunk in the engine-shaft of a mine, below the lowest workings. — In salt-works, a pond in which the water pumped up is retained for use.

Sunday, the first day of the week, commencing at 12 o'clock on the night between Saturday and Sunday, and ending in 24 hours thereafter. No business is transacted in any of the government offices on this day, except the receipt, partial delivery, and despatch of letters by the Post Offices. In some States contracts made on that day are void, but in general they are binding if in other respects they are valid. Notes and bills of exchange falling due on Sunday are payable on the day previous. By the laws of New York no person shall expose to sale any wares, merchandise, goods, or chattels on Sunday, under penalty of forfeiture. — *T. McElrath.*

Sun-Dial, an instrument, now little used, to show the time of day by means of the shadow of a style on a plate.

Sun-Flower, a name for species of *Helianthus*, a large garden flower. The seeds form a good food for poultry, and a useful oil is obtained from them; the leaves and stalks furnish a strong fibre, and the refuse or marc from the seeds, after the oil has been extracted, yields a good cake for cattle.

Sunn. See Hemp (Indian).

Sunderland. See Great Britain.

Supercargo, a person employed to oversee the cargo or sale of the cargo.

The duties of a *S.* are not specially regulated by law, but are dependent upon special agreement between the owners of the cargo and himself. Generally the power of a *S.* does not extend beyond the cargo, the master alone being responsible, and has its limits in the arrival and departure from trading ports. However extended may be the authority conceded to a *S.*, such authority must be subordinate to the common interest of the vessel and cargo. When the powers of a *S.* extend to the navigation of a ship, they must be communicated through the captain, and have reference only to the destination of the ship, and not to the particular management of the ship. Even a *S.*, in cases of necessity, and acting with discretion, may bind the owners of a ship.

Superficies, the outside surface; length and breadth without thickness.

Superfine, of superior quality; excellent in manufacture or texture.

Superintendent, one who has the superintendence, or the oversight or charge of something, with the power of direction; an inspector; an overlooker; an overseer; a director.

Superior (Lake), the largest sheet of fresh water on the surface of the globe, and the most westerly and most remarkable of the great North American Lakes, not only from its magnitude, but also for the picturesque scenery of its borders, and the interest and value attaching to its geological features. It is of a triangular form, extending between lat. 46° 30′ and 49° N., and lon. 85° and 92° 20′ W. Its length, E. to W., is about 360 m., with a mean breadth of about 80 m., so that its area may be taken at about 28,600 sq. m. The mean depth is estimated at 900 ft., and the height of its surface at about 640 ft. above the Atlantic. It receives upwards of 50 rivers, but none is of much importance except the St. Louis, which enters at its S. W. extremity. It discharges itself at its E. extremity into Lakes Huron and Michigan, by the river and falls of St. Mary. This lake embosoms many large and well-wooded islands, the chief of which is Isle Royal.

The country of the N. and E. is a mountainous embankment of rock, from 200 to 1,500 ft. in height; the climate unfavorable, and the vegetation slow and scanty. Upon the S. the land is also high, generally sandy, sterile, and the coast dangerous, subject to storms and sudden transitions of temperature, and to fogs and mists. The mean heat in June and July is about 65° F., but a frightful winter prevails for nine months of the year. The boundary line between Canada and the U. States passes from Lake Huron up the river St. Mary, the outlet of Lake Superior, through the centre of the lower half of this lake, to the mouth of Pigeon River on the N. shore, between Isle Royal and the Canadian coast. The S. coast of the lake from the outlet to Montreal River belongs to the upper peninsula of Michigan. From this river to the river St. Louis at Fond du Lac the coast belongs to Wisconsin, and thence around to Pigeon River to Minnesota. Towards each extremity the lake contracts in width, and at the lower end terminates in a bay which falls into the outlet, the St. Mary's River, at the two opposite headlands of Gros Cape on the N. and Point Iroquois on the S. Thence to the mouth of the St. Mary's at Lake Huron is about 60 m. The navigation of this river is uninterrupted 20 m. below its source at the falls of St. Mary, or, as the place is commonly called, Sault Ste. Marie. Here the river descends in a succession of rapids extending ¾ of a mile, from 18 to 21 ft., the fall varying with the stage of the water in Lake Superior. Birch canoes run these rapids safely, though they appear full of rocks; they have also been run by one sailing vessel, and a sail-boat has ascended them before a strong wind. A ship-canal has been constructed past the falls by the U. States government, so that now the lake is accessible to vessels from the Atlantic Ocean. The copper and iron mines of the S. side are celebrated for their extent and richness. The richest copper mines are situated near Keweenaw Point. The metal occurs principally native, and sometimes in single masses of great size. Native silver is found associated with the native copper, and sometimes intimately mixed with

it. Gold has been found in small specks on the Canadian side. Lead ore occurs in some places. The beds of hematite, or red iron ore, at Marquette, on the American side, are of wonderful extent. They are situated about 12 m. inland. The ore is conveyed by a railway to the harbor, thence by vessels to Cleveland, on Lake Erie, and thence by rail to Pittsburg, where it is smelted. The water of Lake *S.*, remarkable for its coldness, purity, and transparency, is inhabited by many kinds of fish, among which are the delicious white-fish and the gray trout. The most important places on the shores of the lake are Marquette in Michigan, and Duluth in Minnesota.

Superphosphate, any substance with an excess of phosphoric acid. For superphosphate of lime, see MANURE.

Supervisor, an inspector.

Supplement, an appendix to a book; an additional sheet to a newspaper.

Surcharge, an extortion or over-charge.

Surety, a person who binds himself for the payment of a sum of money, or for the performance of something else, for another, who is already bound for the same. A *S.* differs from a *guarantor* in this, that the latter cannot be sued until after a suit against the principal. It differs from *bail* in this, that the latter actually has, or is by law presumed to have, the custody of his principal, while the former has no control over him. The bail may surrender his principal on discharge of his obligations; the *S.* cannot be discharged by such surrender.

Surface-Printing, printing from an inked surface, in contradistinction to the plate-printing process, in which the lines are filled with ink, the surface cleaned, and the ink absorbed from the lines by pressure upon the plate.

Surfacing-Machine, a machine for planing timber.

Surgery, that branch of the science of medicine which treats of manual operations for the healing of diseases or injuries of the body.

Surinam. See GUIANA (DUTCH).

Surplusage, overweight; a remainder after work has been done, etc.

Survey, the act or operation by which the boundaries and superficial extent of tracts of ground, the plans of towns, the courses of roads and rivers, etc.; the act of surveying. — An examination into the condition of a ship or stores, etc. — To measure and plot out lands.

Surveyor, a land-measurer. — An overseer.

Surveyor's Chain. See GUNTER'S CHAIN.

Survivorship, in life assurance, a reversionary benefit contingent upon the circumstance of some life or lives surviving some other life or lives, or of the lives falling according to some assigned order.

Suspended, temporarily removed from employment pending inquiry, etc. — Work that is stopped. — A trader or company that cannot meet his or their engagements.

Suspension-Bridge, a bridge resting on chains or ropes, thrown over fixed supports. Suspension-bridges are of two kinds: 1. Those in which the weight of the roadway is suspended by vertical rods, wire ropes, etc., to chains or cables, which, passing over high piers, hang in catenary curves between them, and are firmly fastened to abutments; 2. Those in which the roadway is suspended from rigid abutting arches of wood or iron, or both combined.

Sutler, a vendor of provisions, liquors, etc., to soldiers.

Suttle, goods after tare has been deducted, and before tret.

Swab, a rough kind of mop, without a fixed handle, made of long rope-yarns, used in ships for washing and drying the decks.

Swage, a tool for giving shape to some kind of yielding or ductile material; it is a model or pattern on which the material is pressed down by means of a burnisher. The mode of *swaging* thin sheets into teapots and other forms is noticed under BRITANNIA METAL.

Swamp, to upset a boat in the water or surf on the beach.

Swan, a well-known genus of web-footed birds, the *Cygnus*, some of which are esteemed for their flesh, while their skins enter into commerce for swans'-down trimmings, and the feathers are imported for quill-making.

Swan's-Down, the small short feathers on the skin of the swan, used for ladies' dress trimmings, powder-puffs, etc.

Swan-Skin, a stout flannel; a kind of woollen blanketing used by letter-press and copper-plate printers.

Swap, to barter; to exchange.

Sward-Cutter, a machine for bringing old grass-lands into tillage.

Swarf, iron filings.

Swarm, a cluster or throng of bees leaving a hive, or taking up new quarters.

Swatow. See CHINA.

Sweating, a kind of fermentation promoted in the manuf. of tobacco. — The heating process which certain kinds of merchandise undergo while on shipboard during the voyage. — The term is also applied to a rough process of debasing the current gold coin, by shaking it in bags; by the friction a portion of the metal is worn off.

Sweating-Bath, a sudatory; a bath for producing sensible sweat.

Sweden and Norway, two kingdoms, now united under one sovereign, embracing between them the entire N.W. peninsula of Europe, usually called Scandinavia, situated between lat. 55° 20′ and 71° 12′ N., and lon. 4° 50′ and 31° E., bounded by the Baltic Sea and Gulf of Bothnia on the E., and the Atlantic on the W.

SWEDEN.

The kingdom of *S* comprises the E. half of the peninsula, and is divided into 24 governments or Län, with an area of 170,980 sq. m., and a pop. of 4,484,542, nearly all of whom are Protestants, and for the most part well educated. Nearly 3,000,000 of the pop. are devoted to agriculture, about 250,000 being owners of the land that they cultivate. The coast-line is about 1,400 m. in extent. The country for the most part is flat, rising in the N. W. to the Kiolen Mountains, which separate *S.* from Norway, and may be divided into three separate districts; the N. and central are mining, the S. is agricultural. The lakes are numerous, covering about one twelfth of the surface; the rivers are chiefly small. The climate in the S. is favorable to producing grain. The principal articles of cultivation are, in addition to the various cereals, potatoes and flax, all of which are grown in sufficient quantities for home consumption. The forests are very extensive, covering nearly one half of the surface of the country, and consisting of pine, birch, fir these are of great importance, as supplying not only pitch and tar, but also the chief fuel. The mineral products are extremely rich; copper in abundance, iron of excellent quality, that known as the Dannemora iron being converted into the finest steel; gold and silver in small proportions; lead, nickel, zinc, cobalt, alum, sulphur, porphyry, and marble. Considerable mines of coal have been discovered in Scania. The chief articles of import are coffee, coals, sugar, rice, tobacco, and other ordinary colonial produce; cloth, yarn, wool, cotton, hides, salt, spirits, oils, rye, pork, and machinery. The chief articles of export are timber, oats, cattle, butter, iron, copper, cobalt, paper, matches, zinc ores, pitch, tar, etc. — The commercial intercourse of *S.* is chiefly with Great Britain as regards exports, and next to it are France and Denmark. As regards imports, the commerce is largest with Great Britain, Germany, Denmark, Norway, and Russia, in the order here indicated. Both the imports and exports more than doubled during the ten years from 1870 to 1879, the total imports rising from \$37,500,000 to over \$80,000,000, and the total exports from \$25,000,000 to \$65,000,000. The staple article of export to Great Britain consists of wood and timber. — The commercial navy of *S.*, in 1879, numbered 4,387 vessels of a burden of 524,982 tons; of which total, 3,700 of 81,659 tons burden, were

steamers.—Mining is one of the most important departments of Swedish industry, and the working of the iron mines in particular is making constant progress by the introduction of new machinery. There were raised in the year 1878, throughout the kingdom, 18,528,505 cwt. of iron ore from mines, besides 211,788 cwt. from lake and bog. The pig-iron produced amounted to 8,109,409 cwt.; the cast goods to 598,438 cwt.; the bar iron to 4,997,285 cwt., and the steel to 1,495,364 cwt. There were also raised in the same year 1,877 lbs. of silver; 21,205 cwt. of copper, and 835,692 cwt. of zinc ore. There are large veins of coal in various parts of *S.*, but no systematic working of them has as yet taken place.—Within recent years a network of railways, very important for the trade and industry of *S.*, has been constructed in the country, partly at the cost of the State. The total length of lines opened for traffic in 1879 was 3,007 m., of which 1,005 m. belonged to the State.—*S.* may be said to have no actual public debt, its revenue being larger than the expenditure. Its nominal public debt, amounting, in 1879, to $50,649,666, entirely consists of advances to railroad companies.—The principal seaports of the kingdom are:—

Gothenburg, or Gottenburg (Sweden *Göteborg*), the second commercial city of the kingdom, on the S. W. coast, bordering the Cattegat, near the mouth of the river Gotha, lat. 57° 42′ 4″ N., lon. 11° 57′ 45″ E. Vessels do not come up close to the city, but lie in the river or harbor, at a short distance from the shore, goods being conveyed to and from them by lighters. The depth of water in the port is 17 ft., and there is no tide, bar, or shallow. The port of Gothenburg had, in 1879, 231 vessels of 87,816 tons. Pop. 71,707.

Stockholm, the capital city and principal port of entry of Sweden, situated at the junction of the lake Maelar with an inlet of the Baltic, in lat. 59° 20′ 6″ N., lon. 18° 3′ 7″ E.; a well-built, handsome city. The entrance to the harbor is intricate and dangerous, and should not be attempted without a pilot; but the harbor itself is capacious and excellent, the largest vessels lying in safety close to the quays, which can accommodate several hundreds. The depth of water in the harbor varies from 5 to 6 fathoms. Kodjupet, directly to the N. of Stockholm, is the passage which determines the draught of vessels bound for this port. The highest water line at Kodjupet is from 28 to 29 ft., but in consequence of the sudden bends in the passage, it is not safe, especially for vessels of much length, to attempt to pass with a greater draught than 24 ft. Off Stockholm is the Svenskar Bjorn light-vessel, in lat. 59° 35′ N., and lon. 19° 46′ W. The city is the centre of Swedish industry and trade; it has numerous manufactories of sugar, tobacco, machinery, cast iron, leather, silk, soap, cloth, porcelain, etc. The port possesses 79 vessels, of a total burden of 29,111 tons. Pop. 165,677.

NORWAY.

Norway, a conjoint kingdom and sovereignty with Sweden, occupying the W. and N. portion of the peninsula, is about 1,100 m. in length, its greatest width being 250 m. It is divided into 20 provinces, or amts, and comprises an area of 122,280 sq. m., with a pop. of 1,818,853. The coast-line is extensive, deeply indented with numerous fiords, and fringed with an immense number of rocky islands. The surface is mountainous, consisting of elevated and barren table-lands, separated by deep and narrow valleys. The cultivated area is but about one 42d part of the country; forests cover about one fourth; the rest consists of naked, uninhabitable mountain-land. Agriculture, though pursued with some vigor of late, is unable to furnish sufficient produce for home consumption; hence it has been necessary to import considerable quantities of corn, meat, and butter. The fisheries give employment to a large part of the population throughout the year. The most important fisheries are cod and herring. The mineral products are similar, but less considerable than those of Sweden. Shipbuilding and timber-dressing are the industrial arts most extensively prosecuted. The imports consist chiefly of the necessary articles of consumption. The chief exports consist of timber, salmon, cod and its oil, herrings, lobsters, minerals, furs, and ice. The average value of the total imports in the five years, 1875-79, was $50,000,000, and of the exports, $35,000,000. Of the imports and exports, 30 per cent come from and go to Great Britain.—The shipping belonging to Norway in 1879 numbered 7,809 vessels, of a total burden of 1,436,278 tons, manned by 61,120 sailors; which is, in proportion to population, the largest commercial navy in the world. In the same year there were in Norway 551 m. of railroad open for traffic, and 420 m. under construction, being a total of 971 m.—The public debt, contracted for the constructing of railroads, amounted in 1879 to 70,700,000 kroners, or $19,938,000.—The three principal seaports are:—

Bergen, a city on the W. coast, in lat. 5° 29′ N., lon. 60° 23′ E. It is situated on a rocky promontory at the head of a deep bay called the Verag, has a fine harbor with two good entrances, and is surrounded by hills, some of which are 2,000 ft. high. It has a considerable export trade, which consists of stock and other fish, horns, skins, rock moss, and timber, and is chiefly carried on with the N. countries of Europe. Pop. 40,100.

Christiania, the capital of Norway, is situated about 80 m. from the sea, at the head of the Christiania fiord, at the foot of the Egeberg, in a finely wooded and picturesque neighborhood, in lat. 59° 54′ N., lon. 10° 45′ E. The harbor during three or four months of the year is ice-locked, and ships then lie at Drobak, about 18 m. S. of the city. As a place of commerce, Christiania has surpassed Bergen, and is now the first port of the kingdom; by the extension of its railroad communication it has also been the chief emporium for the inland produce of the country. Its exports are: wood, pitch, hides, seal-skins, oil, and linseed cake, fish-manure, herrings, anchovies, stock-fish, and iron. The vessels that entered the port in 1879 were 1822, of total tonnage 418,231. Christiania is in steam communication with Gothenburg, Copenhagen, Lübeck, Hamburg, Amsterdam, London, and Hull. Pop. 106,781.

Christiansand, a fortified seaport town of South Norway, on a fiord of the Skager-Rack, in lat. 58° 8′ N., lon. 8° 3′ E. Its exports chiefly consist of timber, pitch, skins, copper and iron, and fish. Pop. 15,884.

MONEY.

By a treaty signed May 27, 1873, with additional treaty of Oct. 16, 1876, Sweden, Norway, and Denmark adopted the same monetary system. See DENMARK (page 267).

WEIGHTS AND MEASURES.

The Swed. *Skalpund*	=	100 *ort*	=	0.937 lbs. av.
" Norw. *Pund*	=	128 *kvintin*	=	1.1 " "
" Swed. *Fot*	=	10 *tum*	=	11.7 inches.
" Norw. *Fod*	=	12 *tommer*	=	12.02 "
" Swed. *Kanna*	=	100 *kubiktum*	=	4.6 pints.
" Norw. *Kande*	=	2 *potter*	=	3.3 "
" Swed. *Mil*	=	360 *ref*	=	6.64 miles.
" Norw. *Mil*	=	36,000 *fod*	=	7.01 "

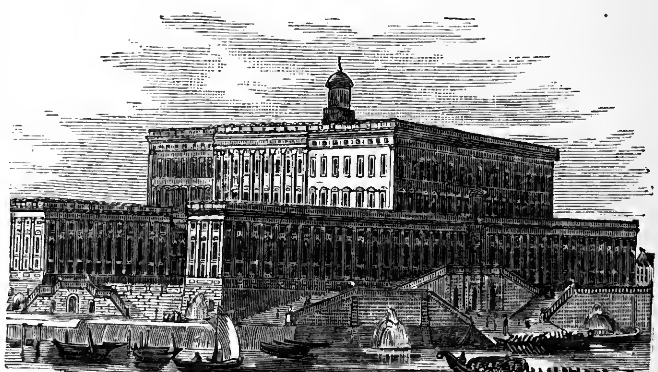

Fig. 464.—THE ROYAL PALACE, STOCKHOLM.

In 1876 the Government presented to the Swedish Diet a bill for the introduction into Sweden of the metric system of weights and measures, which was accepted with some amendments, to the effect that this system will become obligatory in 1889. In Norway a law was passed May 22, 1875, by which the metric system will become obligatory on July 1, 1882.

COMMERCE WITH THE U. STATES.

The commercial intercourse of Sweden and Norway with the U. States is altogether unimportant, and is far from increasing, as shown in the following table of imports and exports for 14 years from 1866 to 1879:—

Year.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
1866...........	$149,882	$7,091	$430,900	$587,873
1867...........	125,267	3,600	911,839	1,040,706
1868...........	177,426	....	1,224,658	1,402,084
1869...........	166,974	....	1,103,611	1,270,585
1870...........	105,532	....	1,180,741	1,286,273
1871...........	1,318,797	83	1,839,024	3,157,904
1872...........	742,055	....	1,770,586	2,512,641
1873...........	2,542,330	....	2,598,052	5,140,382

Year.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
1874	2,385,088	1,386	2,037,914	4,424,388
1875	821,603	....	546,851	1,368,454
1876	1,460,987	5,134	347,945	1,814,066
1877	3,041,625	15,144	243,562	3,300,331
1878	2,792,228	15,332	137,756	2,945,316
1879	2,138,461	8,791	213,924	2,361,176
Total	17,968,255	56,561	14,587,363	32,612,179

For the year 1879 the value of the principal articles imported from and exported to the U. States were as follows: *Imports*, Raw cotton (6,027,903 lbs.), \$557,712; breadstuffs, \$173,802; steam-engines, \$34,370; naval stores, \$11,265; naphtha, \$45,524; petroleum, \$659,167; bacon and hams (10,833,998 lbs.), \$523,990; molasses, \$17,125; timber, \$11,761. *Exports*, Bar iron (9,016,859 lbs.), \$190,464.

Sweep, a very long oar used in low vessels, to force them ahead during calms.

Sweep-Net, a large draw-net used in sea-fishing.

Sweep-Washings, the refuse of shops in which gold and silver are worked.

Sweet, merchandise not changed from a sound or wholesome state; fresh or unchanged. — *T. McElrath.*

Sweet-Corn, a name for a variety of maize chiefly grown for table use, to be eaten in its milky state before it ripens.

Sweet-Flag, the *Acorus calamus*, the rhizomes of which are aromatic, stimulant, and used as an adjunct to other tonics. It is also employed to scent aromatic baths, perfumery, and hair-powder.

Sweet-Meats, a general name for succades; fruits preserved in sugar, and confectionery articles made of sugar.

Sweet-Milk Cheese, cheese made of milk without the cream being skimmed off.

Sweet-Oil, olive-oil used for salads; Lucca or Provence oil.

Sweet-Potato. See POTATO.

Sweets, confectionery; candies; preserves; any saccharine substance, as honey, manna, etc.

Swift, part of a silk-winding machine, on which the skeins of raw silk are stretched or held.

Swimming-Belt, an air-inflated belt worn round the person, as a support in the water.

Swine, a collective name for animals of the pig tribe. See HOG.

Swing, a rocking-seat, or rope attached to poles, or the boughs of a tree. — The distance from the head-centre of a lathe to the bed or ways, or to the rest.

Swing-Bridge, a movable or swivel dividing bridge, employed in docks and canals.

Swingle, an instrument like a sword, for beating flax. — The end of a flail; a swiple. — The wooden spoke of the wire-drawing barrel, or the roller of a plate-press.

Swingle-Tree, a bar to keep the horses' traces open.

Swing-Plough, a turn-rest plough.

Swing Tea-Kettle, a kettle on a stand for table use, moving on pivots.

Swing-Wheel, the balance wheel of a time-piece.

Swiple, the beating end of a flail, connected to the part held in the hands by a thong of leather or fish-skin.

Swiss Cheese. See CHEESE.

Swiss Muslin, a fine, open, transparent cotton goods.

Switch, a small twig or cane; a thin riding-whip.

Switch, the movable rails forming the junction of a siding with the main line of a railroad.

Switzerland, a country of Central Europe, between lat. 45° 50′ and 47° 50′ N., lon. 5° 55′ and 10° 30′ E., bounded N. by Germany, E. by Austria, S. by Italy, and W. by France. It is a confederation of 22 states or cantons. Each of the cantons has its local government. different in organization in most instances, but all based on the principle of the absolute sovereignty of the people. The present constitution, which came into force in 1874, vests the supreme legislation and executive authority in a congress of two chambers, a *Ständerath*, or State Council, and a *Nationalrath*, or National Council. Both chambers united are called the *Bundes-Versammlung*, or Federal Assembly, and as such represent the supreme government of the republic. The chief executive authority is deputed to a *Bundesrath*, or Federal Council, consisting of 7 members, elected for 3 years by the Federal Assembly. The president and vice-president of the Federal Council are the first magistrates of the republic. Both are elected by the Federal Assembly for the term of 1 year, and are not re-eligible till after the expiration of another year. Independent of the Federal Assembly, though issuing from the same, is the *Bundes-Gericht*, or Federal Tribunal. It consists of 11 members, elected for 6 years, by the Federal Assembly. The Federal Tribunal decides, in the last instance, on all matters in dispute between the various cantons of the republic, as well as between the cantons and the Federal Government, and acts in general as high court of appeal. The area and population of each of the 22 cantons, according to the latest official estimates, are as follows: —

Cantons.	Area in sq. miles.	Population.
Graubünden (Grisons)	2,774	92,906
Bern	2,660	582,670
Wallis (Valais)	2,026	100,490
Vaud (Waadt)	1 245	242,439
Ticino (Tessin)	1,095	121,768
St. Gall	780	196,834
Zurich	665	294,994
Lucerne	580	133,316
Fribourg (Freiburg)	644	113,952
Aargau	542	201,567
Uri	415	16,900
Schwytz	351	49,216
Neufchâtel (Neuenburg)	312	102,843
Glarus	267	36,179
Thurgau	382	95,074
Unterwalden	295	27,002
Soleure	303	77,803
Basel	177	107,063
Appenzell	162	60,786
Schaffhausen	116	38,925
Geneva (Genf)	109	99,352
Zug	92	21,775
Total	15,992	2,759,854

At the census of 1870 there were but five towns in *S.* with more than 20,000 inhabitants: namely, Geneva, seat of the watch and jewelry industry, with 46,783; Basel, centre of the silk industry, with 44,834; Bern, political capital, with 36,001; Lausanne, with 26,520; and Zurich, with 21,199 inhabitants.

S. is the most mountainous country of Europe. The ranges of the Alps, and their numerous offsets, extend over the S. and S.E. districts, occupying about one half of the surface. Along the W. boundary runs the Jura ridge; and the country between these two mountain systems has towards the S. the form of a plain, interspersed with isolated hills; and towards the N. it is traversed by groups of hills of moderate elevation. The Alpine and other mountain chains are separated by deep valleys or narrow plains, which form the beds of extensive lakes, as Geneva, Constance, Neufchâtel, Lucerne, and others; or the basins of large rivers, such as the Rhone, Rhine, Inn, Ticino, and Doubs, which all rise in *S.* This difference of elevation produces a singular variety of aspect

and climate; for, while the valleys are scorched by heat, perpetual winter reigns in the heights; but, upon the whole, the country is cold for its latitude.

S. is almost wholly a pastoral country. Except in Thurgau, little corn is produced; and cattle (800,000), sheep, and goats, constitute the chief riches of the rural population. The land is mostly divided among numerous small proprietors, whose diminutive patches occupying but a part of their time, they are necessarily led to employ the remainder in weaving, and such like employments, in which they engage for a mere pittance of wages. This, joined to low fiscal burdens, and the absence of all restrictions on trade or free intercourse with foreigners, has led to manufacturing industry being in a considerable state of advancement in *S.* notwithstanding its geographical disadvantages. The chief sites are the German cantons of Appenzell, St. Gall, Thurgau, Zurich, Aargau, and Basel, distinguished for their cotton and silk fabrics; and the French cantons of Geneva and Neufchâtel, for their watches and jewelry.

The principal exports are silks, cottons, lace, watches, jewelry, straw-plat, cattle, cheese, wine, and liqueurs. The imports consist of wheat (mostly from S. Germany), salt, wine, oil, colonial produce, woollens, leather, hemp, flax, tobacco, cotton-wool, cotton-twist, hardware, iron and other metals, fancy wares, drugs, and dyes. The average value of the foreign trade for each of the 5 years from 1875-1879 was, in round figures: imports, $16,800,000; exports, $22,000,000. Being an inland country, *S.* has only direct commercial intercourse with the four surrounding States; its principal commerce is with France.

In the absence of any special statistics with regard to the special relations of *S.* with the U. States, it is absolutely impossible to state positively whether there is an actual increase or decrease in the total amount of imports into *S.* from the U. States, or of exports from *S.* destined for the American market. The ignorance on this subject is so complete, that, although most persons are agreed as to there being, at all events, a relative increase in the total trade, we cannot confidently affirm that such is the case.

Though in the main a pastoral country, *S.*, as already stated, has a strong tendency to manufacturing industry. According to the last census, there are 1,095,447 individuals supported by agriculture, either wholly or in part. The manufactories employed, at the same date, 216,468 persons; the handicraft, 241,425. In the canton of Basel, the manuf. of silk ribbons, to the annual value of $7,000,000, occupies 6,000 persons; and in the canton of Zurich silk stuffs to the value of $8,000,000 are made by 12,000 operatives. The manuf. of watches and jewelry in the cantons of Neufchâtel, Geneva, Vaud, Bern, and Soleure occupies 36,000 workmen, who produce annually 500,000 watches, — ⅗ of the quantity of gold, and ⅖ of silver, — valued at $9,000,000. In the cantons of St. Gall and Appenzell, 6,000 workers make $2,000,000 worth of embroidery annually. The manuf. of cotton goods occupies upwards of 1,000,000 spindles, 4,000 looms, and 20,000 operatives, besides 38,000 hand-loom weavers. — In 1879, there were 2,365 kilomètres, or 1,478 m. of railroad opened for public traffic. The public debt of the republic amounted, in 1879, to 32,250,000 francs or $6,450,000. It consists mainly of two loans, the first of 12,000,000 francs, or $2,400,000, raised in 1867, and the second of 15,600,000 francs, or $3,120,000, raised in 1871. The whole bears 4½ per cent interest. As a set-off against the debt there exists a so-called "federal fortune," or property belonging to the State, valued at 35,000,000 francs, or $7,000,000. The various cantons have, as their own local administrations, so their own budgets of revenue and expenditure. Most of them have also public debts, but not of a large amount, and abundantly covered, in every instance, by cantonal property, chiefly in land. In 1879 the aggregate debt of all the cantons amounted to 200,000,000 francs, or $40,000,000. Many of the communes have likewise debts, the total of these liabilities amounting, at the same date, to 70,000,000 francs, or $14,000,000.

MONEY, WEIGHTS, AND MEASURES.

The French metric system of money, weights, and measures has been generally adopted in *S.*, with some changes of names, and of subdivisions. These, and their American equivalents, are: —

Money.

The *Franc*, of 10 *Batzen*, and 100 *Rappen* or *Centimes* = $0.193.

Weights and Measures.

The *Centner*, of 50 *Kilogrammes* and 100 *Pfund* = 110 lbs. avoirdupois. The *Arpent* (Land) = ⅞ of an acre.

The *Pfund*, or pound, chief unit of weight, is legally divided into decimal *Grammes*, but the people generally prefer the use of the old halves and quarters, named *Hall-pfund*, and *Viertel-pfund.*

Swivel, a chain or link for twisting round; a link of iron in chain cables.

Swivel-Bridge, a bridge that turns and opens in the middle.

Swivel-Gun, a small piece of cannon moving on a pivot, which may be freely pointed in any direction.

Swivel-Hook, a hook turning in the end of an iron strop-block.

Sword, a cut or thrust weapon.

Sword-Belt, a waist-belt of leather, to support or carry a sword by.

Sword-Hilt, the handle or grasping part of a sword.

Sword-Sheath, the scabbard or case for a sword.

Sword-Stick, a walking-cane concealing a sharp, rapier-like weapon.

Sycamore, a name now applied to the maple, and also to the button-wood. See BUTTON-WOOD and MAPLE.

Sycee Silver, a species of Chinese silver coin or currency, — the silver is swedged or pounded into the shape of a shoe, the pieces fitting one into another like so many saucers, and are dealt out by weight in the same manner as bullion is in New York or London. See CHINA (MONEY).

Sydney. See NEW SOUTH WALES.

Sympiesometer, a very simple and beautiful instrument, which indicates with great precision the changes in the pressure of the atmosphere.

Synopsis, an abridgment.

Syphon. See SIPHON.

Syra. See GREECE.

Syracuse, a seaport city of Sicily, and a Sicilian wine. See SICILY and ITALIAN WINES.

Syracuse, an important and fine city of the State of New York, capital of Onondaga County, is situated in the Onondaga Valley, along Onondaga Creek to its mouth in Onondaga Lake, on the New York Central R.R., 148 m. W. by N. of Albany, and 149½ m. of Buffalo. *S.* is the S. terminus of the Oswego and *S.* Branch of the Delaware, Lackawanna, and Western R.R., and the N. terminus of the Binghamton Branch of that road. The Erie Canal passes through the city, and the Oswego Canal runs N. from near the centre. It is thus the centre of an extensive trade, including grain, lumber, and other staples; but the salt manuf. has always constituted the controlling interest. See SALT. There are 20 salt companies, which manuf. both by solar and artificial heat, employing a large capital and hundreds of men. Besides the salt-works there are upwards of 90 manufacturing establishments, including Bessemer steel-works, a blast-furnace, foundries and machine-shops, rolling-mills, engine and boiler manufactories, planing mills, door, sash, and blind factories, agricultural implements and furniture factories, bolts and nuts, saddlery, saddlery hardware, five manufactories of musical instruments (organs, melodeons, pianos, etc.). *S.* has five national banks, two State banks, two private banking houses, and three savings banks, with upwards of $7,000,000 deposits. Pop. 55,000.

Syracuse, Binghamton, and New York R.R. runs from Geddes to Binghamton, 81 m. This Co., located in New York City, was reorganized after foreclosure in 1857. The road is leased and operated by the Delaware, Lackawanna, and Western R.R. Co. Cap. stock, $2,000,000; funded debt, $2,020,000. Cost of construction and equipment, $4,039,029.

Syria. See TURKEY.

Syrian Tobacco, the *Nicotiana rustica*, a very mild-flavored leaf, which furnishes the Turkish, Latakia, and some of the Asiatic tobaccos.

Syringe, an instrument consisting of a tube and piston; especially, an instrument for injecting

liquids into animal bodies, into wounds, etc., or an instrument in the form of a pump, serving to draw in any fluid, and then to expel it with force. — *Garden syringe*, a large syringe used for ejecting liquids upon plants, shrubs, etc.

Syrup, a concentrated solution of sugar with pure water, or some watery fluid. When sugar is boiled with vegetable infusions or charged with medical agents, the syrup takes the name of the fruit or agent; as, syrup of lemon, syrup of currants, etc. Cane-juice, concentrated to a certain density, forms a syrup which may be shipped and exported without danger of fermenting.

Sze, in China, the hundredth part of a dollar.

T

Tab, a woman's bonnet-cap or border. — A tag or shoe-lace.

Tabby. In the finishing of some varieties of silk and fine stuff goods, they are passed between rollers so engraved as to give a kind of wavy lines to the surface, producing an agreeable play of light and shade. The process is called *tabbying* and is one mode of calendering; the stuff so finished is called *tabby*. There is but little difference between *tabbying*, *watering*, and *moiré*.

Tabinet, a material for window curtains. It is a texture of silk and wool, comprising some of the characteristics of damask and poplin.

Table, any flat or level surface. — A certain piece of furniture on a pedestal or legs, varying in form according to the use for which it is intended. — A sheet of crown-glass. — A catalogue or index. — A collection of numbers or statistical details methodically arranged.

Table-Ale, Table-Beer, weak dinner-ale.

Table-Bell, a small hand-bell for summoning domestics or office attendants.

Table-Cloth, a damask or diaper cloth for a dinner-table. They are usually woven in squares, or in different widths and lengths; some kinds, however, come in the piece and are sold by the yard.

Table-Cover, a woollen or baize ornamental cover for a drawing-room or other table. Table-covers are also made of other materials, as printed, embossed, or plain cloth, velvet pile, French silk damask, cotton or worsted damask, Turkey-red checks, etc.

Table d'Hote, an ordinary where meals are served at fixed hours and prices.

Table Diamond, a gem cut with a flat surface.

Table-Flap, the leaf of a folding-table; a spare piece to lengthen a sliding dining-table.

Table Linen, a collective name for the dinner napkins and cloths spread on a table for serving meals.

Tablet, a small hard writing plate. — A little square. — A monumental slab. — A table for drawing or painting on. — A thin sheet of ivory.

Tablets, a pocket memorandum-book.

Tabletterie, a French commercial name for small works in shell, ivory, bone, etc., and other turned articles, which are not classed under the head of Mercerie.

Table Work, a printer's term for any work set between column rules, which, from the labor and time bestowed on it, is usually charged double the ordinary composition of letter-press.

Tabling, letting one timber into another in ship-building. — A broad hem made in the skirts of sails.

Tabouret, a stool, or seat without arms or back; an embroidery frame.

Tacamahaca, Tacamahac, a fragrant resin obtained from several species of *Icica*. It is chiefly obtained from the West Indies.

Tachometer, an instrument for measuring minute variations of speed.

Tack, a small sharp-pointed nail with a large flat head. They are known as *carpet, leather, gimp, brush, broom, felting*. Their size is designated by the weight of 1,000, as 3 ounce, 6 ounce, 8 ounce, etc. They are chiefly imported from England. *Imp.* duty: Iron tacks, see Iron; tinned tacks, 35 per cent; steel tacks, 45 per cent. — To put a ship about, so as to bring the wind on the opposite side. — To fasten together loosely by long stitches.

Tackle, a purchase formed by a rope rove through one or more blocks. — A general collective name for all fittings, harness, and appurtenances required for working, as fishing-tackle, running rigging, etc.

Tack-Lifter, a tool for taking up tacks from carpets on a floor.

Tael, a Chinese weight and money. See China. By recent decision of the Department of the Treasury, the value of the Shanghai and Che-foo taels, for customs duties valuation, is fixed at $1.35. — A Siamese weight. See Siam.

Taffeta, Taffety, a thin, glossy silk fabric, of a wavy lustre, imparted by pressure and heat, with the application of an acidulous liquor, which produces the effect called "watering." The name is also loosely applied to many kinds of silk goods.

Taffrail, the carved-work or rail round a ship's stern.

Tafia, Taffia, a kind of rum prepared in the West Indies, by the fermentation of the molasses of cane-sugar.

Tag, a piece of brass or other metal fixed to the end of a boot or stay lace, or string, to give rigidity, and facilitate threading; the end or catch-word of an actor's speech. See Teg.

Taganrog. See Russia.

Taggers, a very thin kind of tin plates used for coffin-plate inscriptions and tops of umbrellas. They measure 14 in. by 10, and are packed in boxes of 450 sheets.

Tail, the hinder feathers of a bird. — The obverse of a coin. — The skirt of a coat. See Tails.

Tail-Block, a block strapped with an eye-splice, having a long end left, by which to fasten the block temporarily to the rigging.

Tail-Board, the hinder side or flap of a cart which lets down on hinges.

Tailings, the chaff or lighter parts of winnowed grain.

Taillanderie [Fr.], edge-tools; hardware.

Tailleur [Fr.], a tailor. A *tailleuse* is a mantua-maker or dress-maker; a seamstress.

Tailor, a cutter out and maker of garments in cloth, etc., for male attire.

Tailoring-Machine, a large sewing-machine of which there are several kinds, adapted to a heavy class of goods.

Tail-Piece, the piece of wood to which the strings of bow instruments are fastened. — The set-screw of the rear lathe-spindle.

Tail-Pin, the back-centre pin of a lathe.

Tail-Race, the stream running from a water-mill.

Tails. The tails of several animals are used for different purposes. Fox-tails or brushes are mounted as ornaments, etc. The tails of the squirrel (or Calabar, as they are termed) are valued for trimmings. Those of the ermine or marten (sable tips) are used for the same purpose. Elephants' tails are used as fly-flappers in Africa. Horses' tails furnish the longest and best horse hair.

Tail-Stock, the sliding-block or support, in a lathe which carries the tail-screw and adjustable centre, the *head-stock* being that which supports the mandrel.

Tain, a thin tin plate; tin-foil for mirrors.

Talbotype. See Photography.

Talc, a *silicate of magnesia*, which is found in small quantities embedded in some of the harder

kinds of rock. It is a very curious substance, splitting easily into thin plates which have a kind of semi-metallic lustre. It is used in making boot-powder, cosmetics, polish for alabaster, porcelain paste, crayons, etc. *Imp.* free.

Talega [Sp.], a bag containing a thousand dollars.

Talisman, an amulet; a magical stone, figure, or charm, worn to ward off evil.

Tallow [Fr. *suif;* Ger. *Talg;* It. *sevo, sego;* Sp. *sebo*], animal fat separated by fusion from the membrane in which it occurs, and clarified. It is procured chiefly from oxen and sheep. It is firm and brittle, has a peculiar odor, and is applied to various uses, but particularly to the manufacture of soap and the dressing of leather, and also, but now to a very limited extent, to the making of candles. The tallow, in the living animal, is contained in minute cells. It is separated from the membrane of the cells, for use in manufactures, by a process called *rendering*, involving the use of heat and steam. It can be separated into about ¾ solid stearine, and ¼ liquid oleine; and hence arise many of the varieties of quality in candles and soaps. Tallow is largely imported into the U. States from many countries, but chiefly from England and France. The imports for the year 1879 amounted to 99,963,752 lbs., valued at $6,934,940. *Imp.* duty, 1 ct. per lb. See BAYBERRY TALLOW and VEGETABLE TALLOW.

Tally, a piece of wood on which notches are marked to reckon by.

Tally-Trade, a system of dealing carried on in large towns of England, by which shopkeepers furnish certain articles or commodities on credit to their customers, who agree to pay the stipulated price by certain weekly or monthly instalments.

Tamarind, a pleasant acid fruit, the produce of the *Tamarindus Indica*, a large, handsome tree, growing in the East and West Indies, etc. The pulp of the fruit is nutritive, refrigerant, and laxative, and an infusion forms a cooling drink. The pods are picked before being fully ripe, and preserved between layers of sugar, or boiling sirup is poured over them. It is chiefly imported from the West Indies.

Imp. duty: Tamarinds in their rough and natural condition, and retaining their acid flavor, free; preserved in sugar, brandy or molasses, 35 per cent.

Tambour, an embroidered muslin or lace, the tambouring being performed by a small hook instead of a needle; a species of fancy-work, in threads, sometimes of gold and silver. — A round course of stone.

Tambourine, a musical instrument something like the head of a drum, with metal clappers placed round it to increase the noise.

Tambour-Work, raised flowers, figures, etc., worked on muslins, silks, woollens, etc.

Taminy, a thin woollen stuff, highly glazed.

Tamise, a scarce, bolter, or strainer.

Tammies, a worsted fabric resembling bunting, but closer and finer, made of various colors.

Tampico. See MEXICO.

Tampico Fibre, a Mexican grass, also known as istle.

Tamtam, an Oriental drum or gong, very sonorous, made of an alloy of copper and tin.

Tan, TANNERS'-OOZE, spent or waste oak or other bark, exhausted of the tanning principle by being steeped in water. When dry it is sold to gardeners for producing artificial heat, by fermentation, in pits or beds, and in bark stoves.

Tandem, a gig or dog-cart, with horses driven one before the other, and not harnessed abreast.

Tang, the metal point of a knife, fork, or file, which is inserted in the handle.

Tangier. See MOROCCO.

Tank, a reservoir of standing water; a large basin or cistern. — A case of sheet iron for the stowage of water on shipboard. — That part of the tender of a locomotive-engine which contains the water. Tanks vary in size, according to the power of the engine to which they are attached, and are from about 500 to 1,600 gallons in capacity.

Tankard, a large vessel for the reception of liquors; also, a drinking-mug with a cover.

Tank-Engine, a combined engine and tender for supplying water for a locomotive, and which is made to contain from 800 to 1000 gallons.

Tanner, one who converts skins into leather.

Tanners'-Bark, oak and other barks containing tannin, used for forming a steep for the conversion of skins into leather. See TANNING.

Tannin, TANNIC ACID, GALLO-TANNIC ACID, an astringent vegetable principle met with in several barks and other parts of plants, but especially concentrated in and obtained from the nut-gall of the oak, which contains ⅗ of its weight of this acid. The nut-galls are reduced to powder, and digested with an equal weight of washed ether. The decanted liquid separates on standing into two portions, the denser of which is of a yellow color, and consists of ether holding gallo-tannic acid and various coloring matters in solution. On evaporation it yields a pale-buff residue of amorphous gallo-tannic acid. It is freely soluble in water. It reddens litmus-paper, and dissolves the carbonates with effervescence. The basis of ordinary writing-ink is gallo-tannate of iron. Its most remarkable compound is that which it forms with *gelatine*, which constitutes the basis of leather. *Imp.* duty: Tannin, $2 per lb.; tannic acid, $1 per lb. (?) See LEATHER and TANNING.

Tanning, the mode of combining with the substance of the skin any chemical agent, most generally tannin, having the property of rendering it imputrescible and elastic.

Most of the hides come to the tanner with the hair on; and the removal of this hair is among the early processes. *Green, salted*, and *dried* are three degrees of softness which the hides present; and different degrees of soaking and scraping are required for them. Then the hides are thrown into pits, where they are steeped several days in lime and water to loosen the hairs. This done, the hide is placed upon a *beam* or stool, and scraped on both sides, — on the one with an *unhairing knife*, to scrape off the hair; on the other with a *fleshing knife*, to remove a thin layer of flesh and fat. As the lime dissolves and wastes some of the useful parts of the membrane, many other modes of softening the hair are occasionally adopted, — partially fermenting the hides in a smoke-house; piling up in a heap with spent tan; exposing them to damp, confined air; and employing various acids. The thinner hides, after *unhairing*, are subjected to a process called *bating*,— steeping for many days in an alkaline solution, with frequent stirring and scraping. This removes the hair, and gives suppleness and softness. — *Slow tanning*. By *slow* tanning we mean the ordinary process, without the aid of any new expediting methods. The *tan-pits* are oblong cisterns sunk in the ground of the tan-yard; and here the hides are steeped for a long time. *Oak bark* is the chief tanning ingredient; but there are many others employed. The bark is reduced to powder by grinding in a *bark-mill*, and is then exposed to the action of water, warm or cold, until all the extractable matter is drawn out; the liquor so prepared is called *ooze*. The hides are steeped in this ooze for days, weeks, or even months, according to the kind of leather to be made. The process is greatly varied in different tanneries; but the object is the same in all, — to make the tannin of the ooze combine with the gelatine of the hide. — *Quick tanning*. The price of good, thick leather is necessarily high, on account of the large amount of capital lying dead during the long period (in some cases as much as fifteen months) absorbed in the ordinary tanning process. Hence many attempts have been made to devise new processes. *Spilsbury's* plan depends upon forcing the ooze into the pores of the hide by hydrostatic pressure, instead of allowing it simply to work its way in slowly. *Drake's* plan consists in sewing up the hides into a kind of bag, filling this bag with ooze, and compelling the ooze

to pass through to the outside. *Herapath's* plan involves the use of machinery; the hides are passed repeatedly between rollers, to assist in forcing the ooze into the pores. *Squire's* plan makes use of rotary action. The hides and the ooze are placed in a large, horizontal wooden cylinder or drum, which rotates six or eight times a minute; ridges inside the cylinder increase the agitation to which the hides are exposed, and facilitate the entrance of the ooze into the pores; the ooze in this process is used in a hot state. *Bordie's* plan consists in employing certain metallic and earthy substances, instead of oak bark or other vegetable bodies; he does not convert the hides into actual leather, but so changes it that (in the opinion at least, of the inventor) it will not putrefy or decompose. Although every patentee, of course, claims special merit for his own invention, it is generally found that these methods of quick tanning produce leather more hard and brittle than the old. — When the hides are sufficiently tanned, they are taken out of the tan-pit, washed, drained, and dried in airy lofts. At intervals during the drying they are *struck;* that is, they are scraped with a peculiarly shaped knife, so as to get rid of a kind of bloom which forms on the surface. Very little more remains to be done to prepare the leather (which the hides have

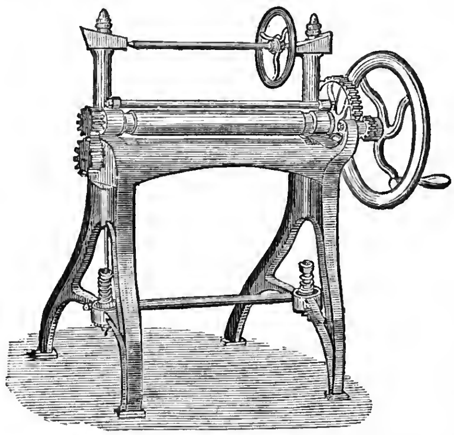

Fig. 465. — Splitting-Machine (Tanning).

now become) for market. It is condensed or hardened, either by being beaten with a kind of tilt hammer, or by rolling under a heavy weight. Sometimes thick hides and skins are *split* into thinner by a beautiful process. (Fig. 465.) A knife-edge works against a rotating cylinder, around which the hide passes. The knife has a reciprocating or lateral movement to and fro; and it is so nicely adjusted that the hide is split by it into two layers or sheets with wonderful equability in thickness. Sometimes the splitting is done when the tanning is finished, sometimes when only half finished. The *grain* or outer half of such a split skin is used in the best kinds of work, the *flesh* or inner half for inferior purposes. The spent oak bark, when it has done its work in the tan-yard, is dried and used for making hot-beds for the garden and as manure for the farm. — The chief article used in tanning is oak bark. The trees are stripped during the warm spring months, when the sap is abundant; a coppice tree about 12 years old yielding the richest bark for the tannin it contains. About 5 lbs. are needed for tanning 1 lb. of leather. Sumach, used in tanning some of the thinner kinds, is the powdered leaves and young branches of the wild olive and the ivy-leaved sumach. Divi-divi, used in making a porous brown leather, is the pod of *Cæsalpinia coriaria.* Valonia, useful in making heavy, impervialle leather, is the acorn-cup of a species of oak growing in the Levant. Nut galls are rich in tannin; but this tannin has a tendency to change into gallic acid, and can on this account only be used with caution by the tanner. Hemlock bark (see Hemlock Bark) is a good substitute for oak bark, and is now largely used for tanning in this country, chiefly in Pennsylvania, where a dense growth of hemlocks covers large tracts of land in Cameron, Elk, McKean, Forest, and Warren Counties. The largest hemlock tanning in the world is probably done between Sterling Run and Warren, along the line of the Philadelphia and Erie Railroad. The district included in 1880 thirteen tanneries, having facilities for tanning 775,000 hides a year. This would produce 1,550,000 sides of sole-leather, averaging 17 lbs. to the side, and aggregating 26,350,000 lbs. of leather a year. At a fair average, the hides weigh 21 lbs. apiece; so that the 775,000 go to the tanneries with an aggregate of 16,275,000 lbs., and emerge in the shape of sole-leather weighing 26,350,000 lbs. These tanneries almost exclusively use South American dry hides, worth, on an average, 23 cents a pound. The 775,000 hides, therefore, cost $3,742,250. The leather averages 25 cents a pound, and the hides that cost $3,742,250 turn out leather that sells for $6,587,500, the gain in value being $2,845,250. All this, however, is not net profit. It represents the labor of nearly 1,500 men at an average of $1.25 a day for 312 days a year, and the value of 155,000 cords or 340,000,000 lbs. of hemlock bark, worth from $4 to $4.50 a cord delivered. The aggregate of the cost of labor is $585,000, and that of the cost of the bark $658,750, a total of $1,243,750. This leaves for the tanners $1,591,500, out of which come taxes, cost of acids, wear and tear of machinery, fuel, lights, insurance, and other incidental expenses, leaving a fair profit at the bottom. The bark runs 2,200 lbs. to the cord, and a cord will tan about ten sides of leather.

Tansy, a garden flower; also the *Tanacetum vulgare*, a roadside plant, which has a very strong and fragrant odor, and aromatic, bitter, and tonic properties.

Tap, a pipe for drawing liquor from casks; also, a plug or spile for stopping a hole pierced in a cask. — A hardened steel screw with a square head, so that it may be turned by a wrench; it is grooved from end to end, and is also slightly tapered; — used for cutting an internal screw, as that of a nut, etc. — The piece of leather fastened upon the sole or heel of a boot or shoe when undergoing repairs.

Tape, a narrow band of cotton, made either red, white, or black; the former is chiefly used for tying up office-papers. White and black tapes are used for dress and binding purposes. *Imp.* duty, according to material.

Tape-Line, a workman's measure of about 50 ft.; a surveying line; a yard-measure rolled in a small case.

Taper. See Candle.

Tapestry, woven or ornamented figured cloth of worsted or silk for covering walls, making bed-hangings, etc.

This kind of textile work, so great a favorite among noble ladies in bygone times, is a sort of medium between weaving and embroidery, partaking somewhat of both. The threads may be of silk, of wool, of silk and wool combined, and may or may not be combined with gold and silver threads; but there must always be differences of *color* in the threads, to reproduce the design. Whether employed for carpets, furniture covers, curtains, or wall decoration, the word *tapestry* applies rather to the mode of producing than to the application. There are three kinds. *Hand tapestry.* The earliest tapestry was undoubtedly worked by hand. Woollen threads, by the patient application of the needle, were worked into a net of meshes, and a colored pattern worked in at the same time; or else a silk pattern was worked into or upon a woollen ground. *Haut-lisse tapestry.* This name is given to a method in which warp threads are arranged vertically, and weft interlaced with them by the tapestry-workers. The warp threads, unwinding from an upper roller, descend to the level of the worker, and are wound on a lower roller when finished. The cartoon or pattern is placed behind the warp, through the threads of which it can be seen, and the pattern is copied on the *front* of the threads with some kind of paint or chalk. The pattern is then worked in at the same time as the fabric itself is made, for a kind of needle forms both the weft and the pattern. It is very slow work, necessitating the use of a number of needles, with an equal number of different kinds and colors of thread; and the worker has every minute to see that the pattern is being correctly followed. *Basse-lisse tapestry.* This name is given when the warp threads are arranged horizontally. The worker sits instead of standing, as in the former case. The cartoon or pattern is placed *under* the warp threads, through which it can be seen. The weft is thrown in with a small apparatus called by the French and Flemish tapestry-weavers a *flûte*, somewhat midway in action between a needle and a shuttle. There are treadles to depress some of the threads to form a kind of shed through which the flûte may pass; the process thus makes a nearer approach to weaving than to embroidery. Tappestry was made in France at a very early date. Arras, Brussels, Antwerp, and Valenciennes excelled in the manufacture, but the best known at the present day is the factory of the Gobelins, near Paris. It was named after Giles Gobelin, a French dyer of the reign of Francis I., was established by Henry IV. about 1606, and was much enlarged by the renowned Colbert in 1666.

Tapestry-Carpet, the name generally given to a very elegant and cheap two-ply or ingrain carpet, the warp or weft being printed before weaving, so as to produce the figure in the cloth.

Tapioca, a species of starch derived from the roots of the bitter cassava, a South American plant, principally raised in Brazil, where it is called *Mandioc* or *Manioc*, and in the West Indies. See CASSAVA. As it appears in commerce, *T.* is a white fecula, agglomerated in irregular, semi-opaque, gum-like masses. It is nutritious, easy of digestion, and is extensively used in the making of puddings. When dressed, it is not easily distinguished from sago. *Imp.* free.

Tapis [Fr.], a table-cover; a carpet.

Tapissier, an upholsterer; a tapestry or carpet-maker.

Taqua-Nut, a name for the fruit of the *Phytelephas macrocarpa*, which furnishes vegetable ivory.

Tar, a thick, viscid oleo-resin, obtained by combustion from pine-trees, and used for coating the planks and cordage of shipping, smearing vessels, etc. It is produced in the U. States in almost all parts of the country where pitch pine and the *Pinus australis* are found, chiefly along the coast of North Carolina, Virginia, and Georgia, where the business is carried on upon a large scale in connection with the manuf. of turpentine, resin, and pitch. The product is not only sufficient for home consumption, but large quantities are annually exported. The exports of tar and pitch for the year 1879 amounted to 52,350 barrels, valued at $101,445. See COAL-TAR.

Tare, an abatement or deduction made from the weight of a parcel of goods, on account of the weight of the chest, cask, bag, etc., in which they are contained. Tare is distinguished into *real tare*, *customary tare*, and *average tare*. The first is the actual weight of the package; the second its supposed weight according to the practice among merchants; and the third is the medium tare, deduced from weighing a few packages, and taking it as the standard for the whole. In some commercial cities tares are generally fixed by custom. The prevailing practice, as to all goods that can be unpacked without injury, both at the custom-house and among merchants, is to ascertain the real tare. Sometimes, however, the buyer and seller make a particular agreement about it.

Rates of Tare prescribed by circular of the Secretary of the Treasury to Collectors of Customs, under Act of Congress, July 14, 1862:—

Treasury Department, Jan. 24, 1863. "Sir: The 16th section of the Tariff Act of the 14th July, 1862, provides that in estimating the allowance for tare on all chests, boxes, cases, casks, bags, or other envelope or covering, of all articles imported liable to pay any duty, where the original invoice is produced at the time of making entry thereof, and the tare shall be specified therein, it shall be lawful for the collector, if he shall see fit, with the consent of the consignees, to estimate the said tare according to such invoice; but in all other cases the real tare shall be allowed, and may be ascertained under such regulations as the Secretary of the Treasury may from time to time prescribe. The execution of the foregoing provision will be governed by the following regulations:—

"In all cases where the original invoice is produced at the time of making the entry thereof, with the tare specified therein, the collector, or collector and naval officer, if such officer there be, may in his or their discretion, and with the consent of the consignees, estimate the tare according to the invoice; otherwise the real tare is to be allowed.

"The schedule of tares annexed is the tare to be allowed in all cases where the invoice tare is not adopted as hereinbefore prescribed: *Provided*, That the collector shall have the right at any time to test the tare on any importation where, in his opinion, the real tare may vary from the tare in the schedule annexed.

"Should any consignee or importer enter a protest in due form of law against the enforcement of any one or more of the tares as herein set forth, the collector will in all such cases adopt the real tare, to be ascertained in the usual manner."

Almonds	in bales	2½ per cent.
do.	in bags	2 do.
do.	in frails	8 do.
Alum	in casks	10 per cent.
Alum, coarse or ground	in sacks	2 pds. per sack.
Barytes		3 per cent.
Cheese	in casks or tubs	10 per cent.
Cassia	in mats	9 do.
Coffee, Rio	in single bags	1 do.
do.	in double bags	2 do.
do. All other, actual tare		
Cinnamon	in bales	6 do.
Cocoa	in bags	2 do.
do.	in ceroons	8 do.
Chicory	in bags	2 do.
Copperas	in casks	10 do.
Currants	in casks	10 do.
Hemp, Manilla	in bales	4 pds. per bale.
do. Hamburg, Leghorn, Trieste		5 do.
Indigo	in ceroons	10 per cent.
Melado		11 do.
Nails	in bags	2 do.
do.	in casks	8 do.
Ochre, dry	in casks	8 do.
do. oil	in casks	12 do.
Peruvian Bark	in ceroons	10 do.
Paris White	in casks	10 do.
Pepper	in bags	2 do.
do.	in double bags	4 do.
Pimento	in bags	2 do.
Raisins	in casks	12 do.
do.	in boxes	25 do.
do.	in half boxes	27 do.
do.	in quarter boxes	29 do.
do.	in frails	4 do.
Rice	in bags	2 do.
Spanish Brown, dry	in casks	10 do.
do. do. oil	in casks	12 do.
Sugar	in hhds	12½ do.
do.	in tierces	12 do.
do.	in bbls	10 do.
do.	in boxes	14 do.
do.	in bags	2 do.
do.	in mats	2½ do.
Salt, fine	in sacks	3 pds. per sack.
Teas, China, or Japan	invoice weight.	
Teas, all others, actual tare		
Tobacco, Leaf	in bales	10 pds. per bale
do. do.	in " ex-covers	12 do.
Whiting	in casks	10 per cent.

Target, a mark to aim at in rifle shooting.

Tariff, a table of duties payable on goods imported or exported. See CUSTOMS DUTIES.—A book of rates or sale prices of goods.

Tarlatan, a kind of thin, transparent muslin, used for ladies' dresses, usually weighing less than 5 oz. to the square yard, and counting less than 100 threads to the square inch. Tarlatans are generally 8–4 wide, and may be white, black, or colored, and are classed with French and Swiss white goods. —*T. McElrath.*

Tarpaulin, breadths of canvas sewn together, oiled and coated with tar, used to cover the hatchways of vessels, barges, wagons, etc.—A sailor's hat or garments made or covered with tarred or painted cloth.

Tarragon, a common garden herb, the *Absinthia dracunculus*, which has warm, aromatic qualities, and is employed as a pickle, and to flavor vinegar.

Tartan, a Scotch plaid of various patterns, the material of which is either silk, cotton, or worsted, or a mixture of two of these.

Tartar [Fr. *tartre cru, blanc et rouge;* Ger. *roher Weinstein;* It. *tartaro volgare*], an acidulous salt which exists in the juice of the grape, and is deposited in wine casks in the form of a crystallized incrustation, more or less thick, which is scraped off. This is crude tartar, or *argol.* It is either white or red, according to the color of the wine: the former is preferred, as it contains fewer impurities than the red; but the properties of both are essentially the same. When good, it is thick, hard, brittle, and brilliant, with but little earthy matter.

The German or Rhenish argol is reckoned the best; after which, that from Bologna. It is used in hat-making, gilding, dyeing, and in the preparation of tartaric acid. *Imp.* duty: crude, or argol dust, free; other than crude, or partially refined, 6 cts. per lb.

Tartar (*Cream of*), [Fr. *crême de tartre;* Ger. *Weinstein rahm;* It. *tartaro purgato*], the bitartrate of potassa of chemists, is argol or crude tartar purified by solution and crystallization. It occurs in small, irregular, gritty crystals, or in the form of a fine white powder. It has an acid, harsh taste. Cream of tartar is used in medicine and the arts. *Imp.* duty, 10 cts. per lb.

Tartar-emetic, the tartrate of potash and antimony, a valuable medicine in catarrh and lung diseases, etc. *Imp.* duty, 15 cts. per lb.

Tartaric acid is procured chiefly from white argol by the action of prepared chalk and sulphuric acid. The crystals formed are of considerable size, permanent, without smell or color, and very acid to the taste. It is used in many of the arts, particularly dyeing and calico-printing; and is much employed as a cheap substitute for citric acid in lemonade and effervescing solutions. *Imp.* duty, 15 cts. per lb.

Task-Work, piece-work; work done by the job.

Tasmania (formerly *Van Dieman's Land*), a British island in the S. Pacific Ocean, off the S. extremity of Australia, from which it is separated by Bass's Straits, in which are situated the Fourneaux Group and King Island, included within the colony. It lies between lat. 39° 35′ and 43° 41′ S., lon. 143° 48′ and 148° 30′ E. Area, 26,215 sq. m., or 26,778,000 acres, of which 332,558 were under cultivation in 1879. Pop. 107,104.

The climate is fine and salubrious. The surface of the island is mountainous, and covered with forests. The chief product is wool, which commands a high price in the English markets. The wheat ranks high for its quality; the yield per acre is large, and the sample heavy. The woods of Tasmania are scarcely yet fully appreciated; the sources of supply are practically inexhaustible, abounding in the most beautiful cabinet-woods and the largest-sized timbers, adapted for every variety of purpose. The mineral kingdom is also well represented, and of late great attention has been directed to its development. Mines of both lode and stream tin, of great richness, are being worked in the N. W. and N. E. portions of the colony. Iron ore exists in nearly every district, and works on an extended scale are now in operation on the banks of the Tamar, in the N. Gold has been found in many places, though it has never yet been extensively worked. Coal, of a good quality, and in easily accessible positions, is very generally distributed over the island. There are in all about 134 m. of railway open, the main line running from Hobart Town to Launceston, through the island. There is a submarine cable communicating with the Australian colonies and New Zealand. — *Hobart Town*, the capital and principal port, is situated in the S. part of the island, on the Derwent, near its junction with Storm Bay, lat. 42° 53′ 5″ S., lon. 147° 21′ 5″ E. The water is deep, and the anchorage good. A jetty has been constructed, accessible to the largest ships. Pop. 20,000.

Tassel, a hanging ornament, as a bunch of silk or gold fringe, etc. — A small ribbon of silk sewed to a book, to be put between the leaves as a marker. — A piece of board under the mantel shelf.

Tatting, narrow edging or lace with a peculiar stitch, knit by hand with a single needle.

Tatty. See Kuss-Kuss.

Taw, a large ornamented marble for boys.

Tawing, a process of preparing kid, sheep, and goats' skins, in which tanning, properly so called, does not take place. The gelatine of the skin is made to combine, not with tannin, but with alum and salt; it becomes a kind of preserved membrane.

This is the process employed in making most of the leather for white kid gloves. Goat, kid, sheep, and lamb skins are all tawed, to produce different varieties of white leather. The wool and hair are loosened and removed by some such process as that described under Felt, and the skin brought to the state of a thin, clean membrane called *pelt*. Several of these pelts are put into a drum or cylinder, with alum, salt, and water; after being rotated some time, the alum and salt combine with the gelatine. Then after washing in clean water, fermenting in bran and water, and drying, each pelt presents itself as a white, tough leather, but wanting in suppleness and gloss. Wheat flour and yolk of egg are dissolved in water, and the pelts are rotated in a drum with this solution; the pelts absorb the whole of the yolk. They are steeped a short time in clear water, spread out openly, and scraped repeatedly over a blunt but smooth metal edge. This gives the final softness and elasticity to the white leather. There may be a greater number of processes for the finer than the cheaper varieties of *kid* (they are all dignified with this name); but the prevailing principle is the incorporation of alum, and then of egg yolk, with the gelatine of the pelt.

Tax, a portion of the produce of the capital and labor of a country, placed at the disposal of the government. Security, protection, and good order being productive of *universal* advantage, it is obvious no individual can complain that he is made to contribute in the same proportion to his means as others for their attainment. Still, like all other values, the smaller the sacrifice for which they can be obtained, so much the better. Every mode by which the expenses of government can be diminished and taxation reduced is an advantage to the public, precisely of the same kind that a diminution in the cost of procuring any commodity is to an individual. Hence the best plan of finance is to *spend little;* and the best of all taxes the *least.*

Taxidermist, a stuffer of animals, and preserver of specimens of natural history.

Tchetwert. See Chetwert.

T-Cloth, a plain cotton fabric manufactured in England for the Chinese and Indian markets, weighing about 4 oz. to the sq. yard, and put up in bales of 50 pieces of 20 yards each. The letter T is stamped on each piece.

Tea [Chinese, *cha, te;* Fr. *thé;* Ger. *Thee;* It. *te;* Port. *cha;* Sp. *te*], the *T.* plant, *Camellia thea*, ordinarily grows to the height of from 3 to 6 ft., and has a general resemblance to the myrtle. It has a white blossom, with yellow style and anthers, not unlike those of a small dog-rose. The stem is bushy, with numerous branches, and very leafy. The leaves are alternate, on short, thick, channelled footstalks, evergreen, of a longish elliptic form, with a blunt notched point, and serrated except at the base. These leaves are the valuable part of the plant. Some other species of *Camellias*, particularly the *Camellia sasanqua*, which closely resembles the *T.*-tree, are the only plants liable to be confounded with it by a careful observer. The leaves of the particular camellia just named are, indeed, often used in some parts of China as a substitute for those of the *T.*-tree. The effects of *T.* on the human frame are those of a very mild narcotic; and, like those of many other narcotics taken in small quantities, — even of opium itself, — they are exhilarating. The green varieties of the plant possess this quality in a higher degree than the black; and a stronger infusion of the former will, in most constitutions, produce considerable excitement and wakefulness. Of all narcotics, however, *T.* is the least pernicious; if, indeed, it be so in any degree, which we very much doubt. Botanically considered, the *T.*-tree is a single species; the green and black, with all the diversities of each, being mere varieties, like the varieties of the grape, produced by difference of climate, soil, locality, age of the crop

when taken, and modes of preparation for the market. Considered as an object of agricultural produce, the *T.* plant bears a close resemblance to the vine. In the husbandry of China, it may be said to take the same place which the vine occupies in the southern countries of Europe. Like the latter, its growth is chiefly confined to hilly tracts, not suited to the growth of grain. The soils capable of producing the finest kinds are within given districts, limited and partial. Skill and care, both in husbandry and preparation, are quite as necessary to the production of good *T.* as to that of good wine. The *T.* plant may be described as a very hardy evergreen, growing readily in the open air, from the equator to the 45th degree of latitude. The Chinese districts which supply the export demand are, however, confined between lat. 25° and 31° N. *T.* has long been in cultivation in Japan, and since the opening of that country to commerce a large trade in it has grown up. The plant is also cultivated in Java, Penang, Assam, and of late in various parts of British India. The experiments in cultivating *T.* in the U. States have been numerous, and attended with success in various parts of the country, particularly in South Carolina and California, so far as the growing of healthy and vigorous plants, and the preparation of small samples of *T.* here and there, can be called a success; but there is a wide difference between these sporadic efforts, which have resulted in the healthy growth of a few ornamental shrubs, and the permanent establishment of a great industry to compete with the inherited dexterity and cheap labor of Asia.

The *T.* plants are raised from nuts, or seeds, usually sown where they are to remain. Three or more are dropped into a hole, and covered with earth four or five inches deep; these come up without any further trouble, and require little culture, except that of removing weeds. The leaves are not collected from the cultivated plants until they are three years old; and, after growing nine or ten years, they are cut down, in order that the young shoots, which will then rise, may afford a greater supply of leaves. The best time to gather the *T.* is while the leaves are small, young, and juicy. The first gathering usually commences at about the end of February, when the leaves are young and unexpanded; the second about the beginning of April; and the third in June. The first collection, which only consists of fine, tender leaves, is most esteemed, and is called by us *Imperial T.* The second is denominated *Tootsjaa*, or Chinese *T.*, because it is infused and imbibed after the Chinese manner. The last gatherings, which are the coarsest and cheapest of all, are drunk by the people of the lowest class. Besides the three kinds of *T.* named above, it may be observed that, by sorting these, the varieties become still further multiplied. The Chinese, however, know nothing of *Imperial T.*, *Flower T.*, and many other names, which in Europe and America serve to distinguish the quality and the price of the article; but besides the common *T.*, they distinguish two other kinds, namely, the *Voui* and *Soumlo*, which are reserved for people of the first order of society, and for those who are sick The principal varieties used in Europe and in this country are the *Green T.*, which is the *Bing*, or common *T.* of the Chinese, and is gathered in April; the *Voui*, or *Vou-tche*, a delicate kind of *Young Hyson*, which differs only from the other in being gathered a few weeks earlier, and consists of the young leaf-buds just as they begin to unfold; and the various descriptions of *Black T.*, which diminish in quality and value as they are collected later in the season, until they reach the lowest kind, called by us *Bohea*, and by the Chinese *Ta-cha*, or large *T.*, on account of the maturity and size of the leaves. The early leaf-buds, in spring, being covered with a white, silky down, are gathered to make *Pekoe*, a corruption of the Canton word *Pa-ko*, white down. A few days' later growth produces what is sometimes styled *Black-leaved Pekoe.* The more fleshy and matured leaves constitute *Souchong;* as they grow still larger and coarser, they form *Congo;* and the last and latest picking of all is the *Bohea.* The variety named above, called *Voui*, is a scarce and expensive article, and the picking of the leaves in so young a state does considerable injury to the plantations. The summer rains, however, which fall copiously about this season, moisten the earth and air, and, if the plants are young and vigorous, they soon push out fresh leaves. The process of gathering *T.* is one of great nicety and importance. Each leaf is plucked separately from the twig; the hands of the gatherer are kept clean; and in collecting some of the finer sorts, it has been stated upon credible authority, that he is obliged for some weeks previous to abstain from all gross food, lest his breath or perspiration might injure the flavor; to wear fine gloves while at work, and to bathe two or three times a day during this period. In the general harvest seasons, the natives are seen in little family groups on the side of every hill, when the weather is dry, engaged in gathering the *T.*-leaves, which are stripped off rapidly and promiscuously into round baskets, made for the purpose, of split bamboo or rattan. When a sufficient quantity is gathered, it is carried home to the cottage or barn, where the operation of drying is performed. The Chinese dislike gathering the leaves on a rainy day for any description of *T.*, and never will do so unless necessity requires it. Some even pretend to distinguish the *T.* made on a rainy day from those made on a sunny day. The process of rolling and drying the leaves, it is stated, can only be learned by actual experience; yet the system adopted to attain this end is as simple as it is efficacious. Let it be borne in mind, however, that the grand object is to expel the moisture, and at the same time to retain as much as possible of the aromatic and other desirable secretions. The mode of scenting green and black *T.* varies a little, and the object in view is to impart the delicate flavor of fine *T.* to the common sorts. The heated leaves of the cured green *T.* are poured into a basket two inches deep, and then covered with a layer of fresh flowers, another layer of leaves and more flowers are then placed above them until the basket is full, when a thatch is covered over the whole, and remains a day. The next day the whole mass is fired in a lined sieve for one or two hours, and the flowers sifted out just before packing in leaden chests; frequently the highly scented *T.* is mixed with plain (one catty to eighteen or twenty) to impart a delicate scent. Black *T.* are sometimes sprinkled with chulan (*Aglaia*) flowers dried by themselves, or even powdered just before the last firing has been given to the *T.*, and the whole packed up together for exportation. But the larger blossoms of the jasmine and *kwei hwa* are not thus mixed with the *T.*, though some may be often seen in lots which have been imperfectly sifted. The cultivation of these flowers for scenting is a branch of agriculture of considerable importance about Canton. The word chop (*hau* or *tsz hau*, a term of common use in the *T.* trade) means merely a brand or mark, and is given by the brokers who make up the lots of *T.* in the country. It is frequently the name of a firm, or merely a fancy appellation applied to each distinct lot of the same quality or origin to distinguish it from other lots, even of the same sort. A chop can therefore be as few as two or three chests or as many as 1,200; a chop of *Congou* is usually 600 chests, but other kinds of *T.* not being so uniform are reckoned by packages, not by chops. The "chop name" consists of two characters, as *Yuhlan* (Magnolia), *Hinglung* (Rising Affluence), *Fangchi* (Fragrant Sesamum), etc., and has slight reference to the origin or quality of the *T.* Duties on *T.*, which once formed one of the largest items of American revenue, have been successively reduced, and lastly *T.* has been placed on the free list of importation. The American Union is, after England, the greatest consumer of *T.* The imports of *T.* into Great Britain for the 10 years from 1869 to 1878 were as follows: —

Year.	Total importation.	Entered for home consumption.	Year.	Total importation.	Entered for home consumption.
	lbs.	lbs.		lbs.	lbs.
1869	139,223,298	111,887,458	1874	162,782,810	137,422,216
1870	141,020,767	117,622,573	1875	197,505,316	145,457,749
1871	169,898,239	123,529,596	1876	185,536,371	149,131,449
1872	184,927,148	127,792,077	1877	187,515,284	151,274,852
1873	163,765,267	132,022,159	1878	204,872,899	157,691,397

The value of *T.* imported into Great Britain for the 3 years, 1876, 1877, and 1878, respectively, was $63,486,020,

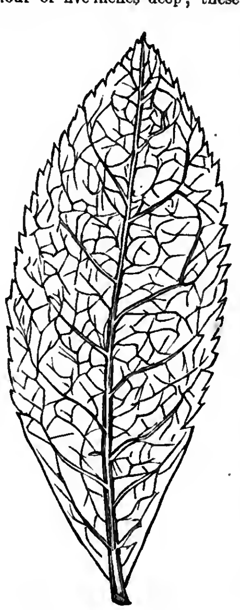

Fig. 466. — Tea-Leaf.

$62,403,700, and $65,485,000. The importation of Indian *T.* increased in 1878 to the extent of 4,606,000 lbs., or 14 per cent.

The following table exhibits the quantities and values of *T.* imported into and exported from the U. States, and the estimated net imports per capita of population, from 1858 to 1879: —

Year.	Imports.		Exports.		Per capita of population.
	lbs.	$	lbs.	$	lbs.
1858	32,995,021	7,261,815	4,228,444	1,384,428	0.97
1859	29,268,757	7,388,741	6,149,468	2,461,563	0.76
1860	31,696,657	8,915,327	5,369,729	1,985,203	0.84
1861	26,117,956	6,977,283	5,101,289	1,556,630	0.66
1862	24,868,421	6,545,664	1,531,644	638,906	0.71
1863	29,761,037	8,013,772	2,739,997	1,032,723	0.80
1864	37,229,176	10,549,880	1,378,154	571,956	1.04
1865	19,568,318	4,956,730	2,719,129	1,912,797	0.49
1866	42,992,738	11,123,231	1,481,290	612,935	1.17
1867	39,892,658	12,415,037	513,084	199,400	1.09
1868	37,843,612	11,111,560	2,217,749	711,751	0.97
1869	43,754,354	13,687,750	2,944,329	947,481	1.08
1870	47,408,481	13,863,273	4,868,010	1,374,056	1.10
1871	51,364,919	17,254,617	6,469,974	1,929,830	1.26
1872	63,811,003	22,943,575	4,441,401	1,259,408	1.46
1873	64,815,136	24,466,170	1,060,196	454,641	1.53
1874	55,811,605	21,112,234	1,670,252	871,956	1.26
1875	64,856,899	22,673,703	1,565,595	714,185	1.44
1876	62,887,153	19,524,166	1,726,908	874,574	1 35
1877	58,347,112	16,181,467	1,508,937	676,566	1.22
1878	65,366,704	15,660,168	2,243,516	737,544	1.32
1879	60,194,673	14,577,618	1,303,138	362,092	1.11

Of the 60,194,673 lbs. of *T.* imported in 1879, 31,293,392 lbs. came from China, 26,798,439 from Japan, and the balance from Hong Kong and other countries. The exports were chiefly to the Dominion of Canada.

There are numerous substitutes for *T.* in different countries, and widely separated peoples have in use some plant, the active principle of which is closely analogous to, if not identical with, that in *T.* See COFFEE, MATÉ, NEW JERSEY TEA, etc.

Teak-Wood, INDIAN OAK, the produce of the *Tectona grandis*, a large forest tree that grows in dry and elevated districts in the south of India, the Burman Empire, Pegu, Ava, Siam, Java, etc. Teak timber is by far the best in the East; it works easily, and, though porous, is strong and durable; it is easily seasoned, and shrinks very little; it is of an oily nature, and therefore does not injure iron. It is as strong as the oak, and somewhat more buoyant. Its durability is more uniform and decided; and to insure that durability it demands less care and preparation; for it may be put in use almost green from the forest, without danger of dry or wet rot. It is fit to endure all climates and alternations of climate. It is extensively exported to England.

Tea-Kettle, a metal boiler for water, with a pouring spout, made of iron, copper, or tin.

Team, a set of oxen or horses working together.

Tea-Pot, a vessel, usually of metal, with a handle and spout, for making and pouring out tea.

Tea-Poy, an ornamental pedestal table, with lifting top, enclosing caddies for holding tea.

Tear, a rent or slit in a garment.

Tease, to comb or clean wool; to card or raise a nap on woollen cloth.

Teasel, FULLER'S THISTLE [Fr. *chardon à carder;* Ger. *Weberdistel, Kratzdistel;* It. *cardo dacardare;* Sp. *cardeucha, cardo peinador*], the *Dipsacus fullonum*, a plant of considerable importance to clothiers, who employ the crooked awns of the heads for raising the nap on woollen cloths. For this purpose they are fixed round the periphery of a large, broad wheel, against which the cloth is held while the machine is turned. In choosing *T.*, the preference should be given to those with the largest burr, and most pointed, which are generally called *male T.* They are mostly used in preparing and dressing stockings and coverlets; the smaller kind, commonly called the fullers', or drapers', and sometimes the *female T.*, are used in the preparation of the finer stuffs, as cloths, rateens, etc. *T.* are imported from France. *Imp.* free.

Tea-Service, TEA-THINGS, the whole appurtenances or utensils required for a tea-table; sometimes applied only to the tea-pot, milk-jug, and sugar-basin, when of silver.

Tea-Urn, an ornamental metal vase, containing a heater, for keeping water boiling on a tea-table.

Technical, relating to any particular art or manuf.

Technologist, a writer or lecturer on the useful arts and manufactures.

Tecum-Fibre, the produce of a palm-leaf resembling green wool, obtained in Brazil. It is manuf. into cordage, fishing-nets, etc.

Teazle. See TEASEL.

Teeth, the incisors of animals, many of which enter into commerce for economic purposes. The tusks of the elephant are misnamed teeth, but the grinders or teeth proper are also used for knife handles and other purposes. The canines of the walrus or sea-morse, and the teeth of the hippopotamus are in demand for the dentist for artificial teeth; while the teeth of many carnivorous animals are used in the East for necklaces and other ornaments. Artificial human teeth are also an important article of commerce. — The tines of a prong or pitch-fork, the spikes of a harrow, the dividing points or dents of a comb, the sharp wires of a carding instrument, the projecting knobs of the edge of a machine or horological wheel, etc.

Teinturier [Fr.], a dyer.

Telegram, a despatch or message received by telegraph.

Telegraph. Telegraphs may conveniently be classed according to the mode in which the actions of the sender produce their effect at the point where the message is received. A first class may include those in which the current is made to deflect magnetized needles; a second may comprise those in which the current, by magnetizing soft iron, causes an index to travel along a dial and point to the letter intended; a third may embrace those in which the same action on soft iron is made to print the despatches, either in ordinary type or in conventional signs; while in a fourth class we may put the instruments which give their indications by sounds only. It is obvious that in some of these systems signs only are used, and a special training and acquaintance with the symbols is necessary, while in the rest the ordinary alphabetic letters are shown or recorded. In the former case the apparatus is simpler, and therefore for the general business of public telegraphy it is almost exclusively employed; while for private purposes, where it is often required that the messages should be despatched and received by persons not acquainted with the symbolic language, the dial telegraph, or that which prints the message in ordinary characters, will continue to be employed, in spite of the greater complexity and greater liability to derangement of the apparatus.

In the needle telegraphs the essential part of the apparatus is a multiplier, having its needle mounted vertically on a horizontal axis, to which is also attached an indicator, visible on the face of the instrument, and formed either of a light strip of wood, or of another magnetized needle within the coil. When the current is sent through the latter, the index is deflected to the right or left, according to the direction in which the current passes. The code of signals generally corresponds with the Morse code. The single-needle instrument, as now made, is of a very simple and inexpensive construction, and it is the form principally used in connection with the working of lines of railroad. A boy will, after a few weeks' practice,

learn to read the signals, and to transmit messages with considerable rapidity. A small case, usually surmounting the instrument, contains a bell or alarm, which serves to call the attention of the clerk at the receiving station. The electric bell-alarm, invented by Wheatstone and Cooke, has been modified in a thousand ways; and as electric alarums or bells

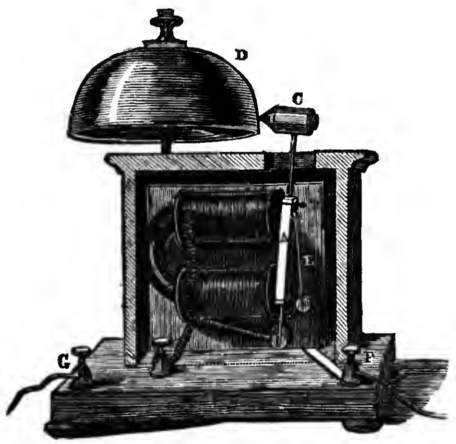

Fig. 467.—Electro-Magnetic Bells.

are now in common use in hotels and even private houses, we give in Fig. 467 a representation of one of the simplest forms, in which the bell is rung continuously by the electric current so long as the circuit is closed. The action is very simple: a soft iron armature, A, is attached to the steel spring, B, and prolonged into a hammer, C, which strikes the bell, D, every time the armature is attracted to the electro-magnet. The armature and the spring, E, form part of the circuit, which is continued by connectors to F, and through the coils to G. The spring, E, does not follow the armature in its motion towards the electro-magnet, and consequently the circuit is broken before the armature touches the magnet; but the hammer strikes the bell, and the elasticity of the spring, B, brings the armature back into contact with E, the circuit

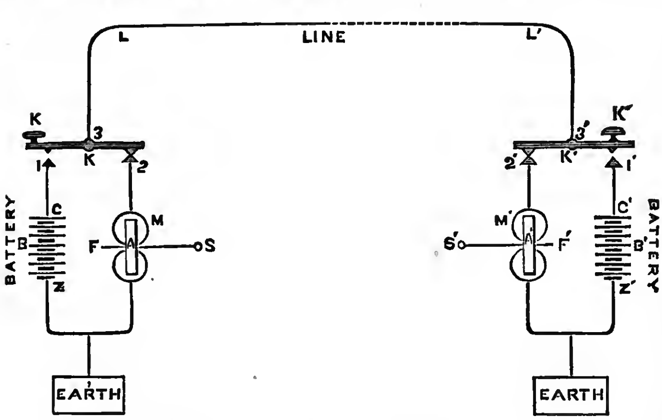

Fig. 468.—Connections of a Telegraphic Line, with Morse Instruments.

is closed, and the motions are repeated, so that the bell is struck a rapid succession of blows. This *make-and-break* movement is precisely similar to that with which Ruhmkorff's coils are usually provided.—The telegraph above described leaves no record of the despatches sent, and hence the messages cannot be read at leisure, and errors which may occur in the transmission cannot be traced to their source. A system which registers the message as actually received, has plainly many advantages over those which merely give a visible or audible signal without leaving any trace. Hence many contrivances have been proposed for making the receiving apparatus print the message in ordinary characters. Such instruments are necessarily very much more complicated in their construction than the ones already mentioned, and by no means so simple as the system we are about to describe, namely, the Morse telegraph, which is universally adopted in America and Europe. The general arrangement of the transmitters, batteries, receiving instruments, etc., should be first studied in its simplest form, as represented by the diagram, Fig. 468. M represents the vertical coils of an electro-magnet, upon which we are supposed to be looking down; the armature, A, is attached to a lever, F, which, by the attraction of the electro-magnet, is therefore drawn down. In the position of the connections, as represented, no current is passing, but if K be pressed down so as to make connection at 1, at the same time it is broken at 2, a current will pass in from the positive pole or battery, B, into the line by 1, 3, L, L', and through 3', 2' through the coils of the electro-magnet at M' into the earth, and so back to the negative pole, Z. The armature, A', will be attracted so long as the current continues. Similarly, contact made at 1' and broken at 2', will affect the electro-magnet, M, from the battery at B'. It should be noticed here that it is not a question of the reversal of currents sent from the same battery; the key merely enables the operator to send a current in one direction, so as to affect the distant electro-magnet whenever or so long as he depresses the key. We shall now examine the construction of the Morse receiving apparatus, one of the most complete forms of which is depicted in Fig. 469. In the present description we wish the reader to consider only the portion of the apparatus towards the left, and to suppose the absence of the electro-magnet at the right-hand side, with all the appliances immediately connected with it. He must regard the electro-magnet, A, as corresponding with M' in Fig. 468, and remember that it is in the power of the distant operator at K to throw the current of his battery through the coils of A, by simply depressing his key. When the current passes the armature, B, it is attracted, and the lever, C, to which it is attached, turns on its bearings at D, and the end, E, of its longer arm is pressed upwards. At this end of the lever, in the earlier form of the instrument, was a blunt steel point, which, while the armature was attracted to the electro-magnet, was pressed into a shallow groove in a metallic roller. Between the roller and the steel point a paper ribbon, half an inch wide, K, was unwound from the drum, L, by the two rollers, M and N, which grip the paper between them as they are turned by clock-work within the case, F. An important improvement was effected when, instead of steel points for embossing the message, the Morse instrument was provided with an arrangement for printing the signals in ink; since the pressure required for embossing the paper is considerably greater than that needed merely to bring it into contact with the edge of a little inked disk. In the inking arrangement the strip of paper travels just below the margin of a vertical disk, turned by the clock-work, and having its plane parallel to the length of the paper strip. The narrow edge of this disk is kept charged with printer's ink, which it receives from a roller. The end of the lever connected with the armature of the electro-magnet is formed of a light strip of metal carrying a narrow projection at the end, over which the paper passes, just beneath, but not touching, the inking-disk. When the current passes, the little projection is lifted up, and raises the paper into contact with the ink, printing either a dot or a dash, according to the duration of the current. The amount of force required to raise an inch or two of the length of the paper ribbon through a space not greater than the twentieth of an inch is but small, and much less than would be required to emboss the paper; so that in a great many cases the part of the apparatus which is represented in Fig. 469, on the right, may be dispensed with. In other cases it is, however, necessary; as when, from the length of the line, the currents are too feeble to give clear indications with the printing lever; and we shall, therefore, presently describe its arrangement and purpose. The clock-work is actuated by a spring, wound by the handle, G, but its action is suspended by a detent, which is released by touching the lever, H. When the clock-work is in action and the current constantly circulating in the coils, a continuous line, parallel to the length of the ribbon, would be printed upon it, in consequence of the contact with the inking-disk, P, being maintained; but when a momentary current only rushes through the coils, the armature, attracted but for an instant, gives rise to merely a dot on the passing paper, while a current of a little duration will cause the paper to be marked with a short line or dash. The dot and the dash are the elementary signs of the Morse code of signals, and these are producible according to the time the contact key is held down at the distant station. By employing various combinations of these two signs, the letters of the alphabet, numer-

als, etc., are indicated. — We have now to ask the reader's attention to the details of the apparatus in Fig. 469, the use of which has not already been pointed out. The electro-magnet, O O′, and the parts immediately connected with it, form what is called a *relay*. The object of this may be illustrated by supposing that the instrument is at one end of a long line, such as that between Edinburgh and London. Let us suppose it is at Edinburgh; the currents sent from London by a battery of convenient size might not be powerful enough to magnetize the soft iron of A with sufficient intensity to give clearness to the signals. They are, therefore, made

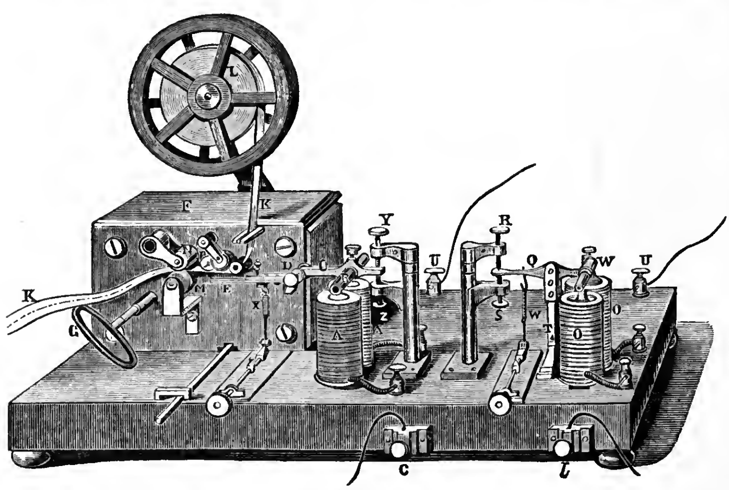

Fig. 469. — Morse Recording Telegraph.

to circulate in the electro-magnet, O, where they act by attracting the armature, W, which has the form of a split tube of soft iron, attached to a very light lever, Q, adjusted with great delicacy, and so that it moves by little magnetic force. The end of the lever works between two adjustable screws, R and S, which are electrically insulated, except that R is in communication with one extremity of the coils of the electro-magnet, A. Q is in metallic communication through the pillar, T, and the binding-screw, U, with the zinc end of a battery at Edinburgh, which is called the local battery, the other pole of which communicates with the other ends of the coils, A, through the screw, U′. When no current from London is passing through O, Q is held down by the spring, W′, and the circuit of the local battery is broken, but the instant the line-current passes, the armature, W, is attracted, and Q makes contact with R, the current from the local battery rushes through the coils, A, and the appropriate movements of the printing lever are effected by its action. X is a spring for drawing down the lever, and it is provided with a screw for adjusting its tension, and Y, Z, are screws for limiting the extent of motion of the lever; under P is the little projection by which the band of paper is pressed against the inking-disk. *l* and *e* are respectively the screws for the line and earth connections. After a clerk has for some time been habituated to working with the Morse instrument, he is able to read the message from the different sounds made by the armature, as dashes or dots are respectively marked, and he usually *listens* to the message, and transcribes it at once into ordinary language by the ear alone. This observation soon led to the adoption of sound alone as the means of signalling; and several instruments on this plan are now in use. — Among the more remarkable forms of recording telegraphs, those of Royal E. House (1848), and Hughes (1856) may be mentioned, in which the message is printed at the receiving station in distinct Roman characters; and as only a single instantaneous current is required to be sent for each letter, the speed with which a message can be despatched is about three times as great as with the Morse instrument. These advantages are, however, obtained only at the cost of great delicacy and complexity in the apparatus, so that it is unfit for ordinary use, although it is much employed on important lines, where competent operators and skilled mechanics and electricians are at hand to keep it duly regulated. These two machines are now almost entirely superseded by the *combination* machine, perfected by G. M. Phelps, of Troy, which combines the most valuable portions of both the House and Hughes patents. This machine, though much simpler than those of House or Hughes, is yet too complicated for a full description in these pages, although it is the best form of type-printing telegraph for long lines yet introduced. The Anders printing telegraph, patented in 1871, and worked by magneto-electricity, is designed for private lines, though capable of operating over distances of 45 m. — From the numerous forms of dial telegraphs we select one for description. All these instruments are characterized by what is called the "step-by-step" movement, and differ in their mechanical details, and in the nature of the apparatus for producing the currents, some being driven by electro-magnets, and others by galvanic batteries. Their principle may be easily explained. Suppose that a ratchet-wheel, having twenty-six teeth, is mounted on an axis carrying a hand over a dial having the letters of the alphabet inscribed upon it. A simple arrangement in connection with an electro-magnet, somewhat like the escapement of a clock, will serve to advance the wheel by one tooth each time a current passes. The diagram, Fig. 470, will at once make this principle clear. E is the electro-magnet, F the armature, separated by the spring, S, from the magnet, except when the current passes, when the catch, C, draws down the tooth in which it is engaged, so that a tooth passes under the point at D; and when the current ceases, the spring, S, brings up the catch to engage the succeeding tooth, and thus the hand moves step by step in the direction of the arrow, advancing each time the electric circuit is closed by one 26th of a revolution.

Very interesting forms of telegraph are those in which a despatch is not merely written or printed, but actually transcribed as a *fac-simile* of the writing in the original; and in this way it is possible for a design to be drawn telegraphically at the distance of hundreds of miles. Like the Hughes printing telegraph, the instruments which produce these apparently marvellous results require synchronous movements at the two stations. But although they are scientifically successful, there appears to be no public demand for these copying telegraphs. One of the best known is Bonelli's, which despatches its messages automatically when they have been set up in raised metal types precisely similar to the Roman capitals in the type of the ordinary

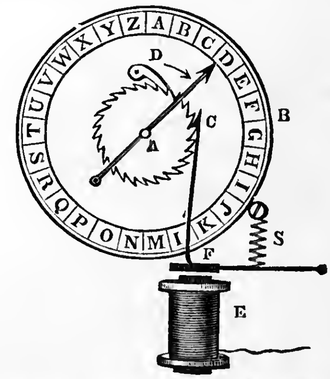

Fig. 470. — The Step-by-step Movement.

printer. In Bonelli's and most other copying telegraphs the impressions are produced by chemical decompositions, effected at the receiving station on the paper prepared to receive the message. By Bonelli's instrument it is said that when the type has been set up, messages can be sent at the extraordinary rate of 1,200 words in one minute of time! The action of this system is such that it is proved to be possible to reproduce in a few seconds — at Boston, say — the very characters of a page of type the moment before set up in New York. The limits of our space will not admit of details of this invention; but we here place before the reader a *fac-simile* of the letters printed by it at the receiving stations.

BONELLI'S CHEMICAL TELEGRAPH.

It now remains to give some account of the *line*, that is, the conductor by which the sending and receiving instruments are united, and along which the currents flow. Overhead lines are nearly always constructed with iron wires, which are usually $\frac{1}{6}$ in. in diameter, and are coated with some substance to protect them from oxidation. Zinc is often used for this purpose, the wire being drawn through melted zinc, by which it becomes covered with a film of this metal,—a process known as "galvanizing" iron. Another mode is to cover the wires with tar, or to varnish them from time to time with boiled linseed oil, and this *must* be done in populous places, where the gases in the air are liable to act upon the zinc. Sometimes *underground* wires are used, and these are often made of copper, covered with gutta-percha, and are laid in wooden troughs, or in iron pipes. They are protected by having tape or other material, saturated with tar or bitumen, wound round them. The poles employed to suspend the overhead wires are generally made of larch or fir, of such a length that when securely fixed in the ground they rise 12 ft. to 25 ft.

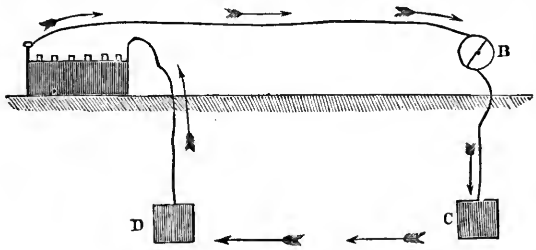

Fig. 471.—Wire and Earth Circuit.

above it, and at the top have a diameter of about 5 in. About thirty poles are required for each mile, and every tenth pole forms a "stretching-post," being made stronger than the others and provided with some appliance by which the wires can be tightened when required. The wires are attached to the posts by insulating supports; but at every pole there is always some "leakage," the amount of which depends on the form, material, and condition of the insulators. Glass is quite unsuitable, because its surface strongly attracts moisture, which thus forms a conducting film. All things considered, porcelain is found to be the best insulating material for this purpose, since moisture is not readily deposited on its surface, and even rain runs off without wetting it, and it is durable, strong, and clean.

It need hardly be remarked that only a single wire is required with most of the modern instruments for communication between any two places. Each of the many wires often seen attached to the telegraph posts along a road or railway represents a distinct line of communication; that is, one wire may connect the two termini, another may join an intermediate station and a terminus, a third may belong to two intermediate stations, and so on. The discovery by Steinheil of the apparent conducting power of the earth has led us to regard the earth as replacing for telegraphic purposes the second or return wire, which was at first supposed essential. For instance, when a battery current had to be sent from Station A, which we may suppose to be New York, to Station B, which we may call Newark, it was at first thought requisite to provide a wire for the return of the current after it had traversed the coils at the receiving station. But now the connections are made as shown in Fig. 471, where the return wire is dispensed with, except a small portion at each end, which is connected with a large plate of copper buried in the earth; the arrows show the direction of the current, according to the commonly received notion. By this plan the current is increased in intensity, for the "earth circuit" appears to offer less resistance than the copper wire. The view, however, which regards the earth not as a conductor in the same sense as the wire, but as the great *reservoir or storehouse of electricity*, accords better with known facts.

Submarine Telegraph.—The most striking achievements in connection with telegraphy are the great submarine lines which unite the Old and New Worlds. Morse and Wheatstone about the same time (1839–43) independently experimented with sub-aqueous insulated wires, and their success gave rise to numerous projects for submarine lines. How far any of these might have been practical need not here be discussed, but it fortunately happened that some years after this, the electrical properties of gutta-percha were recognized, and this material, so admirably adapted for forming the insulating covering of wires, was taken advantage of by Brett & Co., who obtained the right of establishing an electric telegraph between France and England, and they succeeded in laying down the first submarine cable. This cable extended from Dover to Cape Grisnez near Calais, and the experiment proved successful; but, unfortunately, the cable was severed within a week by the sharp rocks on which it rested near the French coast. It proved, however, the excellent insulating property of the new material, and demonstrated the possibility of submarine telegraphic communication. Another cable was manufactured, in which the gutta-percha core was protected by a covering of iron wires laid specially on the exterior, and thus combining greater security with a far larger amount of tenacity. The cable when complete was 27 m. in length, and each mile weighed 7 tons. This cable was laid in 1851, and from that time it has been in constant use, with the exception of a few interruptions from accidental ruptures. Its success immediately led to the construction of other cables, connecting England with Ireland, Belgium, Holland, etc. But the most interesting enterprises of this kind are those in which a telegraphic cable is submerged to a profound depth in a broad ocean, crossing from one continent to another. The *Atlantic Telegraph* is the most notable example of this kind. After discovering that a plateau or shelf extending along the bed of the Atlantic nearly from Ireland to America would form a convenient resting-place for such a cable, Mr. Cyrus Field and other energetic men formed a company in 1855, obtained capital, ordered a cable to be made in 1856, and tried to submerge it in 1857. Disasters occurred, and it was not till 1858 that the submersion took place along the whole distance from Ireland to Newfoundland. The cable worked well for about a month, but then failed, and has never since been of any use. Commercial and other difficulties prevented anything further being done from 1859 till 1864. During 1864–65 a new cable was fabricated, and in the summer of the last-named year an attempt was made to submerge it; but this failed, owing to breakages, until 1,200 m. of it were left lying useless at the bottom of the ocean. In 1866, two cables having failed, a third was made; this was laid successfully from Ireland to Newfoundland, and the broken cable of 1865 was raised and restored. Before the close of the year both cables were working. Since that time a third English cable (1875) and two French cables (1869 and 1880) are come into operation between Europe and the U. States. The cables used for these purposes are, in fact, small ropes, little more than an inch in thickness (Fig. 472). In the centre or heart are seven copper wires, together forming the conductor, and well connected with each other by a composition of melted tar and gutta-percha. Outside this is the insulator, consisting of several layers of gutta-percha, alternating with other layers of the cement just mentioned. Outside the insulator is a coating of jute yarn steeped in tanning liquor to make it more durable. Outside the jute are ten stout iron wires, coiled round like the strands of a rope, and each one previously covered with a layer of tarred Manilla yarn. Thus was produced a telegraphic cable $1\frac{1}{10}$ in. diameter, weighing $1\frac{3}{4}$ tons per mile, having 400 lbs. of gutta-percha outside 300 lbs. of copper wire per mile, and able to bear a breaking strain of $7\frac{3}{4}$ tons. The construction of such a cable comprises many beautiful processes. To make the conductor of seven copper wires, the central wire is drawn off from a drum through a hole in a horizontal table; the drum revolves on a vertical axis, and has near its circumference six wheels, each revolving on its own horizontal axis, and each filled with copper wire; by this arrangement, as fast as the central copper wire is drawn from the drum, all the other six wires are twisted closely around it. To make the insulator around the conductor, gutta-percha is brought to the state of a soft putty, and forced into a cylindrical form by pressure through a tube; the copper conductor has already been placed in the centre of the

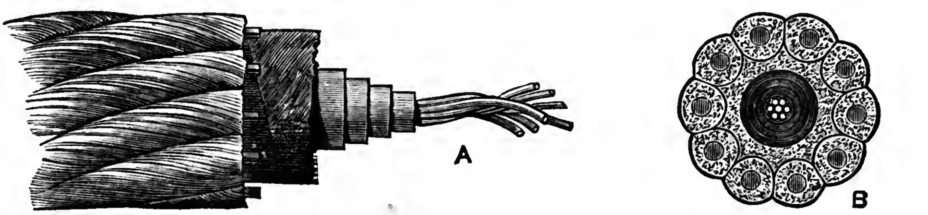

Fig. 472.—Atlantic Telegraph Cable of 1866.

tube; and it thus results that the conductor emerges from the tube nicely coated with a smooth, cylindrical layer of gutta-percha. The layer being thin, the cord is passed through this process twice more, to give a sufficient thickness of gutta-percha. To coat the cord with jute, the cord is wound on drums, and the drums mounted on vertical axles; unwinding again from the drums, the cord passes upwards through a hole in a horizontal table, being bound round as it travels with moistened jute, supplied by revolving bobbins. Lastly, to put on the external envelope of stout iron wires, a revolving table is provided at its circumference with ten revolving bobbins; this twofold revolution causes the wires to pass to the central cord, and there to encircle it as a compact coil. The instruments for transmitting and receiving messages are refinements on those in use for land telegraph. The achievements in submarine telegraphy are truly marvellous. As an example, on Feb. 1, 1868, a message was sent from Ireland to California, through 2,000 m. of ocean and sea cable and 5,000 m. of land wire; it reached California *in two minutes*, and got there *on Jan.* 31, California time! It thus outstripped the sun so far as concerns longitude and clock-time. This wonderful rapidity depended on special arrangements, planned to show what *can* be done if urgency demands.

Telephone. See this word in the Appendix.

Telescope, an instrument consisting of a tube which contains a system of lenses, designed to aid the eye in viewing distant objects, causing them to appear magnified by enlarging the angle under which they are seen, and at the same time increasing their brightness by collecting into the eye a greater number of rays than would naturally enter it.

This grandest of all aids to the astronomer does not come within the scope of the present volume in regard to its scientific purposes; nor does its manuf. admit of much description, except as involving the highest class of workmanship in metal and glass. The *kinds* of *T.* are chiefly as follows: A *refracting T.* has an object-glass at one end and an eye-piece at the other; the object-glass collects the rays of light into a focus, while the eye-piece adjusts them to the proper condition for entering the eye. A *reflecting T.* has no object-glass: there is a large metallic mirror or speculum to collect and reflect the rays, and a smaller speculum to assist in conveying them to the eye-piece. These are the main differences in *T.*; but there are minor diversities of many kinds. Thus a *Galilean T.* is a refractor, having some such action as an opera-glass; a *Gregorian* is a reflector with the eye-piece in a line with an opening in the centre of the large speculum; a *Newtonian* reflector has the eye-piece on one side of the tube; a *Herschelian* reflector has the eye-piece at the remote end of the tube; an *equatorial* is a *T.*, whether refracting or reflecting, which has a clock-work movement to enable it to follow the daily motion of the heavenly bodies; a *transit* instrument is a *T.* so adjusted as to keep always in the plane of the meridian; a *zenith* instrument is a *T.* so fixed as to point to a spot directly overhead. Although refracting *T.* are those with which most astronomical discoveries have been made, reflectors are those which have involved the most remarkable manipulative or manufacturing features.

Teller, derived from tallier (one who keeps a tally), one who reckons or counts; an officer in a bank, etc., who receives or pays money.

Tell-Tale, a cabin compass suspended from the beams. — An instrument connected with the rudder wheel for showing the position of the tiller. — An indicator or gauge of numbers entering or leaving by a turnstile, etc.

Tellurine, a kind of French tripoli, for polishing metal and cleaning marbles, etc.

Tellurium, a tin-white metal.

Telotype, the name given to a printing electric telegraph.

Temper, a due mixture of different qualities; the condition of a metal, as temper-steel. — A name given in the West Indies to purified lime, used for mixing with cane-juice when boiling, to clarify it, or separate the feculencies, an operation called by sugar-planters *tempering*. Wood ashes also bear this name in Brazil, being used for the same purpose.

Tempering. Steel goods depend much for their quality on *tempering*, or changes in hardness produced by changes in heating and cooling. Heated steel becomes harder by plunging into cold water or oil; but it also becomes too brittle for many purposes; and this brittleness is removed by again heating slowly and moderately. The art consists in partly undoing by heating what has been done by cooling; and the degree of *temper* thus given is made to depend on the purpose to which the steel is to be applied. When cautiously heated to the required degree, it is again suddenly cooled, and has now acquired hardness without being too brittle. The workmen know by the *color* — straw-yellow, dark-yellow, brass-yellow, purple-yellow, light-purple, dark-purple, dark-blue, greenish-blue — when the proper degree of hardness has been obtained. The lowest temperature, 430° F., gives a very pale straw-yellow, and is suitable for lancets; the highest, about 600° (blue or purple), is almost too soft for any kind of steel instruments. Penknives, chisels, files, shears, axes, plane-irons, table-knives, swords, gun-locks, watch-springs, fine saws, and coarse saws have their respective temperatures and colors, to denote the proper temper or degree of hardness.

Template, in metal-working and wood-shaping, is a pattern or guide, presenting curved and straight edges in a certain determinate arrangement. Its purpose is to insure correctness in distance, size, and figure in various kinds of cutting, filing, piercing, etc.

Tenaculum, a fine hook used by medical men to get hold of arteries in wounds, for tying.

Tenant, one who occupies or rents houses or lands belonging to another, on lease, or for a shorter term.

Tender, an attendant wagon, carrying water and fuel for a locomotive on a railway. — A bidding under a contract; an offer made for goods. — A proposed compromise, or payment of money considered due.

Tender (Legal). See MONEY.

Teneriffe. See CANARY ISLANDS.

Tennessee, one of the U. States, lies between lat. 35° and 36° 30′ N., lon. 81° 30′ and 90° 10′ W. It is bounded N. by Kentucky and Virginia, S. E. by North Carolina, S. by Georgia, Alabama, and Mississippi, and W. by Arkansas and Missouri, from which it is separated by the Mississippi River. Its mean length is 400 m., and its mean breadth 114 m.; area, 42,000 sq. m. *T.* is divided into 94 counties. *Nashville*, the capital, is a handsome city, situated on the left bank of the Cumberland River, 200 m. from its mouth, and 233 m. E. N. E. of Memphis, lat. 36° 9′ N., lon. 86° 49′ W. This city has an extensive wholesale trade in dry-goods, groceries, etc.; it has also a large cotton factory, 7 saw mills, 5 flour mills, 6 iron foundries, several paper mills, tanneries, etc. Nashville is, after Memphis, the most wealthy and populous city in the State, and is noted for its enterprising spirit, literary taste, and polished society. Pop. 45,000. *Memphis*, the chief commercial city and port of delivery, is separately noted below. The other chief places are, Chattanooga (pop. 8,000), and Knoxville (pop. 10,000). Pop. of the State, 1,475,000.

The E. part of the State is intersected by the Alleghany chain, which here sometimes rises to the height of 2,000 ft.; the middle part is hilly, while the W. portion is an extensive undulating plain. Principal rivers, after the Mississippi, the Tennessee and Cumberland, both tributaries of the Ohio. The Tennessee River has its chief source in this State; it is 1,250 m long, and is navigable for steamboats to Florence, in Alabama, 276 m. above its entrance into the Ohio, and from the head of the Muscle Shoals for boats, 250 m. further. Cumberland River, which, rising in Kentucky, runs mainly in *T.*, is navigable for steamboats 198 m., to Nashville, and for boats 300 m. farther. It enters the Ohio River, in Kentucky, 60 m. from the Mississippi River. *T.* is generally well watered, and, except in the mountainous parts, comprises a good deal of excellent land. Eastern *T.* is crossed by several ridges of the Alleghany Mountains, some of which have elevations of 2,000

ft.; The middle region, between the Cumberland and Tennessee Rivers, is hilly, and the W. level. The W. portion of the State, between the Mississippi and the Tennessee, is of the alluvial and cretaceous formation of the shores of the Atlantic and Gulf of Mexico. Extensive iron mines lie between the Tennessee and Cumberland Rivers. Coal is also now extensively mined. The Sewanee mines, operated by the Tennessee Coal and Railroad Co., mined and shipped 87,076 tons of coal, and 97,768 tons of coke, in 1879, while the Soddy coal mine shipped 24,600 tons. At Victoria, the Southern State Coal Co. are producing washed coke from their excellent coal, which is being used in Nashville, Chattanooga, Knoxville, and Atlanta, by founders, and meets with entire approval from the list of consumers, which is steadily growing. Agriculture is the chief occupation of the inhabitants. The products are much the same as those of Kentucky, with the addition of cotton. Indian corn, wheat, and oats are the principal corn crops. Cotton is grown in most parts of the State. Tobacco is also cultivated to a considerable extent. In the E. of the State, grazing is a good deal attended to, and considerable numbers of cattle and sheep are reared for the markets of the E. States. Coal, iron, salt, marble, and nitre, together with cotton, Indian corn, wheat, flour, tobacco, fruit, tar, turpentine, rosin, whiskey, live-stock, salted meats, lard, coarse linen goods, and gunpowder constitute the principal exports, being mostly sent down the Mississippi to New Orleans. The climate of *T.* is temperate and remarkably salubrious, excepting in the swampy districts of the N. W. The E. division is noted for its pure, bracing mountain air. The State is richly wooded with pine, oak, hickory, sugar-maple, cedar, and black walnut; the woods abound in game, as bears, deer, opossums, racoons, foxes, etc.; and the country is rich in horses, cattle, sheep, and swine, — the last running in large herds in the woods, and fattening on nuts. According to the returns given by the last census, the total number of acres of land in farms was 19,581,214; of which 6,843,278 consisted of improved lands, 10,771,396 of woodland, and 1,966,540 of other unimproved soil; the cash value of farms under cultivation, $218,743,747, exclusive of $8,199,487 of implements and machinery; amount of wages paid for husbandry during the year, $7,118,003; total value of farm products, $86,472,847; of orchard stuffs, $571,520; of market-gardens, $301,093; of lumber, etc., $335,317. The amount and value of agricultural products and live-stock for the year 1879 are given in the work under the names of each of the principal crops and animals. There has been for the last few years in *T.*, a marked progress in many industries, especially in the manufacture of iron, liquors, carriages, and wagons, and cotton, the last-named industry numbering now 42 mills, with 56,375 spindles. In 1879 *T.* had 25 national banks in operation, whose paid-in capital was $3,080,300. There were, besides, 31 State banks and private banks, whose aggregate capital was $1,769,671. *T.* is burdened with a heavy State debt, and grave questions have been raised as to the nature and extent of the State's liability on the bonds which have been issued by it, and as to what course should be pursued with the bonded indebtedness. In 1879 there were outstanding 20,219 bonds, amounting to $20,221,300. In 10 years the State has paid 3 instalments of interest, and 7 were past due, amounting to $4,052,717, making a debt, principal, and interest, of $24,274,000. The assessed value of real estate was $153,678,885; of town lots, $48,661,930; and of other taxable property, $20,871,338; total, $223,212,153. Tax per capita, $0.15 *T.* had 1,492 m. of railroad in operation in 1870, and 1,666 in 1879. The following table exhibits the names of the railroad companies, the total length of road, and the total length in *T.* in 1879: —

Fig. 473. — Seal of Tennessee.

Companies.	Total length of line.	Total length in State.
	Miles.	Miles.
Brownsville and Ohio	10.00	10.00
Chicago, St. Louis, and New Orleans	571.66	117.00
Cincinnati, Cumberland Gap, and Charleston	...... 40.00	...... 40.00
Duck River Valley	20.00	20.00
East Tennessee, Virginia, and Georgia	272.00	256.50
Knoxville and Charleston	16.00	16.00
Knoxville and Ohio	38.35	38.35
Louisville and Nashville	650.64	257.70
McMinnville and Manc	35.00	35.00
Memphis and Charleston	292.00	101.50
Memphis, Paducah, and Northern	115.00	65.00
Mississippi and Tennessee	100.00	10.00
Mobile and Ohio	528.60	117.70
Nashville, Chattanooga, and St. Louis	348.50	308.00
Nashville and Decatur	122.30	93.80
Rockwood and Tennessee River	6.00	6.00
Rogersville and Jefferson	15.50	15.50
St. Louis and Southeastern	47.00	47.00
Ship Island, Ripley, and Kentucky	25.00	2.50
Tennessee (and Coal)	21.00	21.00
Tennessee and Pacific	30.00	30.00
Western and Atlantic	138.00	17.00
Winchester and Alabama	40.00	40.00

Memphis, a port of delivery, the principal commercial city of the State, and the most populous and important place on the Mississippi River, between St. Louis and New Orleans, is situated in lat. 35° 8′ N., lon. 90° 5′ W., 420 m. below St. Louis. It occupies the only eligible site for a commercial depot from the mouth of the Ohio to Vicksburg, a distance of 650 m. The bluff on which it stands is elevated about 60 ft. above high-water mark, and its base is washed by the river for a distance of 3 m., while a bed of sandstone projects into the stream and forms a convenient landing. The river is deep enough to float the largest ship of war from this place to its mouth, and the navigation is open in all seasons of the year. Memphis is the W. terminus of the Memphis and Charleston R.R., and the E. terminus of the Memphis and Little Rock R.R. The other R.R. that meet here are the Mississippi and Tennessee, Louisville and Nashville, Tennessee, Memphis, and Raleigh, and the Paducah. Lines of steamers run to St. Louis, Cincinnati, Vicksburg, Napoleon (Arkansas), and to the Arkansas, White, and St. Francis Rivers. The quantity of cotton received here in a year is about 400,000 bales. The actual value of the trade of Memphis is about $65,000,000, viz.: cotton, $34,000,000; groceries and western produce, $13,000,000; dry goods, etc., $15,000,000; home manufactures, $4,000,000. Besides other factories, Memphis has 3 of the largest oil mills in the U. States, consuming about 500,000 sacks of cotton seed annually, and producing nearly $1,000,000 worth of cotton-seed oil and oil-cake. The city has 4 national banks, 4 other banks, a chamber of commerce, a cotton exchange, and a custom house. The number of vessels belonging to the port in 1880 was 67 of 11,260 tons in aggregate. Pop. 60,000.

Tennis-Racket, an expensive kind of stringed battledore, made of gut, for playing at tennis.

Tenon, the end of a piece of wood cut so as to fit into another piece. — The heel of a mast made to fit into the step or socket.

Tenon-Saw, a saw with a brass or steel back, for cutting tenons.

Tent, a shelter or canvas enclosure for field use, of which there are many kinds made, round or oblong shaped, etc. Some are called marquees and booths, the smaller circular kinds being those chiefly known as tents. — A roll of lint put into a wound. A rich, red muscadine wine, grown near Cadiz, drunk generally as a stomachic.

Tentering, a technical term for stretching woven goods to dry, after being stiffened and dyed.

Tenture, paper-hangings or tapestry for a wall.

Terminus, the station at the beginning or end of a railroad.

Terne-Plates, thin sheet iron coated with an amalgam of tin and lead.

Terra-Cotta, or "baked clay," is midway in quality between earthenware and tile clay, but always has some kind of artistic finish. The ancient terra-cotta was slightly-baked clay of fine quality. The modern variety contains fine sand or calcined flint mixed with fine clay. It is sometimes pressed into form while having the consistence of clay; sometimes poured as a creamy liquid into moulds. It is used for pinnacles, capitals, and other architectural decorations, as well as for chimney-pieces, figures, vases, etc. The employment of terra-cotta has much extended in recent years, and even large statues are made in this material.

Terra Japonica. See Catechu.

Terre Haute and Indianapolis R. R. runs from Indianapolis, Ind., to Illinois State line, 79.70 m.; coal branches, 34.15 m.; total, 113.85 m. This Co., chartered in 1847, and located in Terre Haute, Ind., leases and operates, at a rate of 30 per cent of gross earnings, the St. Louis, Vandalia, and Terre Haute R. R. Cap. stock, $1,988,150; funded debt, $1,600,000; floating debt, $291,968. Per contra: cost of construction, $3,081,378; stocks and bonds, $1,354,529; other assets, $724,608.

Terrier, a small dog for ferreting out vermin. — A wimble or auger.

Terry-Velvet, a kind of silk plush or ribbed velvet.

Tertian, a liquid-measure for wine, equal to 70 gallons.

Tessellated Pavement, a mosaic or checkered work; a marble flooring in black and white squares.

Test, a large cupel, or a vessel in which metals are melted for trial and refinement. — A substance which, on being applied to other substances whose composition is unknown, indicates by the sensible effects which it produces or fails to produce, their constituent elements. — To refine, as gold or silver by means of lead, in a test, by the vitrification, scorification, etc., of all extraneous matter.

Testimonial, a letter of recommendation; a certificate of character; honorary present.

Test-Paper, unsized paper colored by a concentrated vegetable infusion, as of blue cabbage, or of litmus, used as a chemical test. If colored by an infusion of blue cabbage, it acquires a bright-green color by contact with alkalies, and a bright-red color by contact with acids.

Teutonia Fire Insurance Co., located in Philadelphia, Pa., organized in 1871. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $37,360; risks in force, $2,462,819; premiums, $17,679. Premiums received since the organization of the Co., $185,857; losses paid, $51,244; cash dividends paid to stockholders, $79,253.

Texas, the largest State of the American Union, is situated between lat. 25° 50′ and 36° 30′ N., and lon. 93° 30′ and 107′ W.; extreme length from S. E. to N. W. more than 800 m.; greatest breadth from E. to W., about 750 m.; area, 237,504 sq. m. It is bounded N. by New Mexico, the Indian Territory, from which it is separated by the Red River, and Arkansas; E. by Arkansas and Louisiana, from the latter of which it is separated in part by the Sabine; S. E. by the Gulf of Mexico; and S. W. and W. by Mexico and New Mexico. *T.* is divided into 174 counties, besides an extensive, unorganized region in the W. part of the State, the N. part of which is called Bexar territory, and the S. part Young territory. *Austin*, the capital, is beautifully situated on the Colorado River, on the Austin Branch of the Houston and Texas Central R. R., and the Brazos Branch of the International and Great Northern R. R., 164 m. W. by N. from Houston, lat. 30° 16′ N., lon. 97° 22′ W. Pop. 6,000. Galveston, the principal seaport and to this day the most important commercial city of the State, is separately given below. The other principal cities are San Antonio (pop. 20,000), Houston (pop. 15,000), Brownsville (see below), and Jefferson (pop. 6,000). Pop. of the State, 1,400,000.

The general aspect of the country is that of a vast inclined plane, gradually sloping from the mountains on the W. eastward to the sea, and intersected by numerous rivers, all having a S. E. direction. The State may be divided into three separate regions, differing in many respects from each other. The first, or level, region, extends along the coast with a breadth inland varying from 100 to 70 and 30 m. The soil of this region is principally a rich pasture land. The second division, the largest of the three, is the undulating or rolling-prairie region, which extends for 150 or 200 m. farther inland, its wide grassy tracks alternating with others that are thickly timbered. These last are especially prevalent in the E., though the bottoms and river valleys throughout the whole region are well wooded. Limestone and sandstone form the common substrata of this region; the upper soil consists of a rich friable loam, mixed indeed with sand, but seldom to such an extent as to prevent the culture of the most exhausting products. The third, or mountainous region, situated principally in the S.W., includes the Sierra Guadalupe, a portion of the Mexican Alps, and a desert tract at the foot of the mountains. It has been little explored, and is without settlements. The mountain sides are clothed with forests of pine, oak, cedar, and a great variety of trees and shrubs, and they enclose extensive alluvial valleys, most of which are susceptible of irrigation and culture. After the rivers already named, the principal, proceeding from N. to S., are the Neches, Trinity, Brazos, Colorado, and Nueces. They all fall into the Gulf of Mexico, or rather (except the Brazos) into its bays and lagoons. The coast presents everywhere formidable obstacles to navigation, in the long, low, narrow belts of land by which it is fenced, and which bound the lagoons; in the want of harbors for vessels drawing more than 12½ ft. water; and in the bars at the mouths of the rivers. Still, however, steam vessels have been able to enter and ascend these rivers to a considerable distance. The Rio Grande del Norte, a noble stream, having an estimated course of 1,800 m., is, though in parts broken by rapids, an important commercial channel. Galveston Bay, into which the Trinity flows, by far the finest on the coast, is about 35 m. in length N. and S., and from 12 to 18 m. E. and W. Its average depth is about 12 ft., but in the channel there are from 18 to 30 ft. water. The Texan year is divided into a wet and a dry season. The former lasts from December to March, during which N. and N. E. winds are most prevalent; the latter from March till the end of November, during which the winds vary from the S. E. round to S. W. It may be subdivided into spring, summer, and autumn. From April to September the thermometer in different parts of the country has been found, at a general average, to range from 63° to 100°; average heat, 9 A. M., 73° F.; at noon, 83°; 3 P. M., 77°. These great heats are, however, tempered by continual and strong breezes, which commence soon after sunrise, and continue till about 3 or 4 o'clock P. M., and the nights throughout the year are cool. From March to October little rain falls, though thunder-storms frequently occur. During the rest of the year wet weather is prevalent; the rivers swell and inundate the country, and the roads are generally rendered impassable. Snow is seldom seen in the winter, except on the mountains. The surface is in most parts covered with luxuriant native grass, comprising, with the common prairie-grass, the gama, musquite, wild clover, and wild rye, and affording excellent pasturage. It has also an ample supply of timber, as well for use as for ornament. Live-oak (*Quercus sempervirens*), so valuable for shipbuilding, is here more abundant and of better quality, perhaps, than in any other part of America. White, black, and post oak, ash, elm, hickory, mezquite (acacia), walnut, sycamore, *bois d'arc* (so called from the Indians using it to make their bows), cypress, and caoutchouc, are among the common trees; and the mountainous parts in the S. E. abound with pine and cedar of fine quality. Among the natural curiosities of the country is the "Cross-timber" of N. *T.*, a continuous series of forests, varying in width from 5 to 50 m., and extending in a direct line about the 97th degree of W. lon. from the woody region at the sources of the Trinity, N. to the Arkansas River. It appears at a distance like an immense wall of wood, and such is its linear regularity from the W., that it looks as if it were planted by art. It forms the great boundary of the W. prairies. *T.* is amply supplied with fruits and garden products. Peaches do well in large portions of the State, and apples thrive in the N. Pears, blackberries, and strawberries are also raised. Seven species of grape are indigenous. In the S. figs and oranges may be produced. The chief crops are cotton, Indian corn, and wheat, which last is chiefly raised in the N. The sugar-cane is cultivated principally on the Brazos near its mouth, and rice in the S. E. corner of the State. Oats, barley, beans, tobacco, and sweet and Irish potatoes are also raised to some extent. The number of acres of land in farms in *T.*, as reported by the last census, was 18,396,523; of which 2,964,836 consisted of improved lands, 7,662,294 of woodland, and 7,769,393 of other unimproved soil; the cash value of farms under cultivation, $60,149,950, exclusive of $3,396,793 of implements

Fig. 474. — Seal of Texas.

and machinery Amount of wages paid for husbandry during the year, $4,777,638 ; total value of farm products, $49,185,170 ; of orchard, $69,172 ; of market-gardens, $74,924 ; of lumber, etc., $66,841. The amount and value of agricultural products and live-stock are given in this work under the particular names of each of the principal crops and animals In 1879 there were in *T.* 11 national banks in operation, whose paid-in capital was $1,100,000. There were, besides, 102 State banks and private bankers, whose aggregate capital was $3,707,057. The public debt, in the same year, amounted to $4,987,974 ; the taxable property was valued at $243,202,424 ; tax per capita, $0 87. An extensive railroad system has been projected, and is rapidly progressing in *T*, designed to plaee every important point in direct communication with the great marts of the country. There were 32 m. of railroad in operation in 1854, 451 in 1862, 711 in 1870, and 2,428 in 1879, divided into 26 lines, as shown in the following table: —

Companies.	Total length of line	Total length in State
Central and Montgomery	20.00	20.00
Corpus Christi, San Diego, & R. Grande	40 00	40.00
Dallas and Wichita	20.00	20 00
Denison and Pacific	25.75	25.75
Denison and South-eastern	20.00	20 00
East Line and Red River	93 00	93 00
Galveston, Brazos, and Colorado	15.50	15.50
Galveston, Harrisburg, and San Antonio	215.00	215 00
Galveston, Houston, and Henderson	50.00	50.00
Georgetown	10.00	10.00
Gulf, Colorado, and Santa Fé	63 00	63 00
Gulf, Western Texas, and Pacific	68.80	68.80
Henderson and Overton	16.00	16 00
Houston, East and West Texas	55.50	55.50
Houston and Texas Central	521.75	521 75
International and Great Northern	519.30	519 30
Longview and Sabine Valley	12 00	12.00
Missouri, Kansas, and Texas	785 80	5 50
Neches (Lumber)	8.00	8.00
Rio Grande	22 00	22.00
Sabine Pass and North-western	11 00	11.00
Texas and New Orleans	108.00	108 00
Texas and Pacific	443 86	436.15
Texas and St. Louis	22.00	22.00
Texas Transportion	7 75	7 75
Texas Western	42.00	42.00

T. has four ports of entry, of which three are here given, the fourth, El Paso, being of too small importance to be separately noticed : —

Brownsville, the capital of Cameron County, and port of entry of the two customs districts of Brazos de Santiago and Corpus Christi, is situated on the N bank of the Rio Grande, about 35 m. from its entrance into the Gulf of Mexico, and 330 m. S. S. W. of Galveston, opposite the Mexican town of Matamoras. It is connected with Point Isabel, 22 m. distant, by the Rio Grande R. R. In 1879 the two customs districts possessed 42 vessels of 2,323 tons in aggregate. In the foreign trade, 32 vessels of 28,060 tons entered, and 18 vessels of 6,118 tons, cleared; in the coastwise trade, 180 vessels of 54,664 tons entered, and 80 vessels of 22,549 tons cleared For the same year the imports from foreign countries amounted to $2,269,138 ; exports, $1,531,554. Pop. 6,000.

Galveston, the most populous and commercial city of the State, and the principal port of entry, is situated on the Gulf of Mexico, on an island at the mouth of a bay of its own neme, about 450 m., W. by S. of New Orleans, in lat. 29° 18′ N., lon. 94° 50′ W. The island of Galveston is about 30 m in length and 3 m. in breadth, its mean elevation above sea level being only 4 or 5 ft. The bay extends N. from the city to the mouth of Trinity River, a distance of 35 m., and varies in breadth from 12 to 18 m. The harbor has 12 or 14 ft. of water over the bar at low tide. Galveston is the S. E. terminus of the Galveston, Houston, and Henderson R. R , and of the Gulf, Colorado, and Santa Fé R. R. It has regular communication by steamer with New York, New Orleans, Indianola, Morgan City, Havana, Liverpool, etc. Its commerce is considerable, and nearly 450,000 bales of cotton are annually received there. The principle articles of export are cotton, hides, grain, pork, and beef. The value of exports for the year 1879 was $16,393,877; of imports, $871,938. During the same year 215 vessels of 135,500 tons entered, and 203 of 128,399 tons cleared, the port in the foreign trade; 371 vessels of 384,326 tons entered, and 286 of 250,603 tons cleared, in the coastwise trade. In 1880, 200 vessels of 11,535 tons belonged to the port Pop. 26,000.

Indianola, the port of entry of Saluria customs district, and capital of Calhoun County, is situated on the W. shore of Matagorda Bay, 120 m. S. W. of Galveston. It is the terminus of the Gulf, Western Texas, and Pacific R. R., and communicates regularly with Galveston and Corpus Christi by steamer. Its commerce is considerable, its exports consisting chiefly of horses, cattle, and hogs, hides, cotton, and wool For the year 1879 the value of its exports was $573,940 : of imports, $104,459. During the same year 34 vessels of 35,135 tons entered, and 42 vessels of 43,797 tons cleared, in the foreign trade; 170 vessels of 117,135 tons entered, and 126 vessels of 20,783 tons cleared, in the coastwise trade. In 1880, 37 vessels of 1,087 tons belonged to the port Pop. 4,000.

Texas and New Orleans R. R. runs between Houston, Texas, and Orange (Sabine River), 108 m. This Co., located in Houston, was reorganized in 1874, and the reconstructed road was opened in 1876. Cap stock, $3,000,000; funded debt, $1,142,000; State school fund (6 %), $548,854.

Texas and Pacific R. R. runs from Marshall to Fort Worth, 179.73 m.: Shreveport Division, 39.96 m.; Jefferson Division, 69.05 m.; Transcontinental Division (from Texarkana, Ark. line, to Sherman, Tex.), 155.12 m.; total length of all lines, 443.86 m. This Co., located in Marshall, Tex., (executive office in Philadelphia), was organized under Act of Congress of 1871, and additional powers for franchises were granted it by supplementary Acts of Congress, passed in 1872-'74. The congressional land-grants amount to 20 sections per mile in California, and 40 sections per mile in the Territories between the States of Texas and California. The official estimate of these grants is 18,000,000 acres Under grants from the State of Texas, the Co. is besides entitled to 8,083¼ sections of land of 640 acres each, or 4,716,342 acres, and to 211½ sections, or 135,360 acres, the title to which is not settled. Cap. stock, $7,018,500; funded and fundable debt, $18,806,225. Cost of construction, $26,540,239.

Text-Book, a book explaining the principles of a science, etc.

Textile, anything that can be woven.

Texture, the web of a fabric; the manner of weaving.

Thaler, an old German coin. See GERMANY.

Tharm, twisted gut.

Thatch, dried grass, straw, palm-leaves, or other vegetable materials used for covering barns or houses.

Theatre, a play-house; a lecture-hall.

The Hague. See HOLLAND.

Theodolite, ALTOMETER, in surveying, an instrument used for measuring the angular distances between objects projected on the plane of the horizon. In its simplest form the *T.* consists of a divided circle, which has to be set parallel with the horizon, and a telescope which has so much motion in a vertical plane as to enable the observer to view any object which he may require, above or below the horizon.

Thermography, the art of copying engravings or any printed characters from paper on metal plates.

Thermometer, an instrument for measuring the degrees of heat. There are three different kinds in use: 1. Fahrenheit's, which is chiefly used in Great Britain, the U. States, and Holland, the freezing point on which is at 32°, and the boiling point 212°; 2. Reaumur's, now generally used in Spain, and in some other States of Europe, the freezing point, or zero of which is 0°, and the boiling point 80°. 3. The Centigrade thermometer, which is universally used throughout France, and in the northern and middle kingdoms of Europe; the zero or freezing point is 0°, and boiling point 100°. The following table gives the conversion of Centigrade degrees into their Reaumur and Fahrenheit representatives, for temperatures ranging between the freezing point of mercury and the boiling point of water: —

Cent.	Reau.	Fahr.	Cent.	Reau.	Fahr.
+100	80.0	212.0	+30	24.0	86.0
99	79.2	210.2	29	23.2	84.2
98	78.4	208.4	28	22.4	82.4
97	77 6	206.6	27	21.6	80.6
96	76.8	204.8	26	20.8	78.8
95	76.0	203.0	25	20.0	77.0
94	75.2	201.2	24	19.2	75.2
93	74.4	199.4	23	18.4	73.4
92	73.6	197.6	22	17.6	71.6
91	72.8	195.8	21	16.8	69.8
90	72.0	194.0	20	16.0	68.0
89	71.2	192.2	19	15.2	66.2
88	70.4	190.4	18	14.4	64.4
87	69.6	188.6	17	13.6	62.6
86	68.8	186.8	16	12.8	60.8
85	68.0	185.0	15	12.0	59.0
84	67.2	183.2	14	11.2	57.2
83	66.4	181.4	13	10.4	55.4
82	65.6	179.6	12	9.6	53.6
81	64.8	177.8	11	8.8	51.8
80	64 0	176.0	10	8.0	50.0
79	63.2	174 2	9	7.2	48.2
78	62.4	172.4	8	6.4	46.4
77	61.6	170.6	7	5.6	44.6
76	60.8	168 8	6	4.8	42.8
75	60.0	167 0	5	4.0	41.0
74	59.2	165.2	4	3.2	39.2
73	58 4	163.4	3	2.4	37.4
72	57.6	161.6	2	1.6	35.6
71	56.8	159.8	1	0.8	33.8
70	56.0	158.0	0	0.0	32.0
69	55.2	156.2	—1	−0.8	30.2
68	54.4	154.4	2	1.6	28.4
67	53.6	152.6	3	2.4	26.6
66	52.8	150.8	4	3.2	24.8
65	52.0	149.0	5	4.0	23.0
64	51.2	147.2	6	4.8	21.2
63	50.4	145.4	7	5.6	19.4
62	49.6	143.6	8	6.4	17.6
61	48.8	141.8	9	7.2	15.8
60	48.0	140.0	10	8 0	14.0
59	47.2	138.2	11	8.8	12.2
58	46.4	136.4	12	9.6	10.4
57	45.6	134 6	13	10.4	8.6
56	44.8	132.8	14	11.2	6.8
55	44.0	131.0	15	12.0	5.0
54	43.2	129.2	16	12.8	3.2
53	42.4	127.4	17	13.6	1.4
52	41.6	125.6	18	14.4	—0.4
51	40.8	123.8	19	15.2	2.2
50	40.0	122.0	20	16.0	4.0
49	39.2	120.2	21	16.8	5.8
48	38.4	118.4	22	17.6	7.6
47	37.6	116.6	23	18.4	9.4
46	36.8	114.8	24	19.2	11.2
45	36.0	113.0	25	20.0	13.0
44	35.2	111.2	26	20.8	14.8
43	34.4	109.4	27	21.6	16.6
42	33.6	107.6	28	22.4	18.4
41	32.8	105.8	29	23.2	20.2
40	32.0	104.0	30	24.0	22.0
39	31.2	102.2	31	24.8	23.8
38	30.4	100.4	32	25.6	25.6
37	29.6	98.6	33	26.4	27.4
36	28.8	96.8	34	27.2	29.2
35	28.0	95.0	35	28.0	31.0
34	27.2	93.2	36	28.8	32.8
33	26.4	91.4	37	29.6	34.6
32	25.6	89.6	38	30.4	36.4
31	24.8	87.8	39	31.2	38.2

For degrees above the boiling point of water or under the freezing point of mercury, the degrees in the three scales can be converted into each other by way of the two following rules: —

To convert Centigrade or Reaumur's into Fahrenheit's Degrees. — Multiply the number of degrees by 9, divide the product by 5 for Centigrade, or by 4 for Reaumur's; add 32 to the quotient, and the sum will be degrees of Fahrenheit.

To convert Fahrenheit's into Centigrade or Reaumur's Degrees. — Subtract 32 from the number of degrees, and divide the remainder by 9; multiply the quotient by 5 for Centigrade, or 4 for Reaumur's; the products will be the required degrees respectively.

Thermoscope, a very sensitive kind of thermometer.

Thibet, Tibet [native and proper name, *Bodyul*], extends E. and W. from Kashmir and the Karakorum range to the prov. of Szechuen in China. Its S. boundary is for the most part the N. slope of the S. range of the Himalayas; its N. boundary is, on the map, the range of the Kuen Lun Mountains. Throughout the N. half of this vast region, however, Thibetan sovereignty is little exercised, Thibet proper being that country which lies between the N. and S. ranges of the three parallel chains of mountains which form the Himalayan system. It is divided into 4 prov., Ari, Tsang, U, and Kam. Ari, a mountainous region, borders on Kashmir and Nepal; Kam adjoins Szechuen. Between these two lies Central or Great Thibet, comprising the prov. of Tsang and U. The Tsanpu or Upper Brahmaputra, rising near Lake Mansarowah, traverses the entire length of the two prov. The capital is Lhasa, in the prov. of U, situated on one of the tributaries of the Tsanpu, 11,700 ft. above the sea. The form of government is a hierarchy; the religion is Buddhism, which was introduced in the seventh century, long after its adoption in China. The most important article of belief in this very complicated form of religion is that Buddhas or celestial beings appear in the flesh, and on their death reappear as infants. Several incarnations coexist, the two most important being the Dalai Lama of the monastery of Potala at Lhasa, and the Teshu Lama, of Teshu Lumbo; and there is, besides, the Grand Lama, whose influence extends over Mongolia. In former times there was an important trade between Thibet and the plains of India; and Warren Hastings, with an idea of reviving it, despatched an embassy to the Dalai Lama in 1774. The policy which he so successfully commenced was, however, discontinued after his departure from India, and since the passes were closed to foreigners by the Chinese, whose suzerainty the Thibetans acknowledge. The extraordinary geographical features of Thibet, the height of its mountain ranges, and the general elevation of the country, the great rivers which here take their rise, the numerous lakes, some fresh and others salt, and situated from 13,800 to 15,400 ft. above the sea, the amiable character of the people and the beauty of their religion, all combine to give it an interest, which is enhanced by the mystery in which it is still shrouded, the paucity of our knowledge, and the difficulty of adding to it.

Thibet-Cloth, a camlet or fabric made of coarse goats'-hair.

Thick-Set, a stout twilled cotton cloth; a fustian cord or velveteen. See Fustian.

Thieves'-Vinegar, a kind of aromatic vinegar for a sick-room, consisting of the dried tops of rosemary, sage-leaves, lavender-flowers, and bruised cloves, steeped in acetic acid and boiling water. It derives its name and popularity from a story, that four thieves who plundered the dead bodies during the plague with perfect security, attributed the cause of the impunity to the use of this disinfectant.

Thill, the shaft of a wagon.

Thimble, an iron ring with a concave rim for a rope or strap used on shipboard. — A metal cap or protection for the finger of a tailor or seamstress.

Thistle (Fuller's). See Teasel.

Tholes, Thowls, the pins in the gunwale of a boat, between which an oar rests when pulling, instead of on the rowlocks.

Thon, the French name for the tunny-fish.

Thong, a strap of leather.

Thorn-Apple, a wild plant, the *Datura stramonium*, which has qualities like those of henbane and belladonna. The seeds produce maniacal delirium, but are used medicinally to allay pain in tic-douloureux, mania, epilepsy, etc.

Thornback, the *Raia clavata*, a fish of the skate

family, which is in the best condition for the table about November.

Thoroughfare, a passage; a much-frequented way; a street.

Thrashing, THRESHING, the act of beating out the grain from heads. In former times, the hand-flail was the only implement used for *T.* corn; it separated the grain from the husks and straw very effectively; but that method is too expensive in this country, and has been abandoned in Europe for the same cause, and also because it was found that the flail always bruised a large number of seeds. Proper machines, provided with a large number of flails, or other parts answering the same purpose, and moved by the power of water, wind, or horses, were soon introduced. It was found that by this means the process of *T.* could be effected more cheaply, more quickly, and with less damage to the health of the thrasher, than by the old means. To the farmer on an extensive scale, the *T.*-machine is an absolute necessity.

In the present improved forms of the *T.*-machine, a rapid motion is given to a hollow cylinder round a horizontal axis; on the outer surface there are projecting ribs, parallel to the axis, at equal distance from each other; the width of these is from two to six in. Round one half of the cylinder is a case, the inner surface of which is lined with plates of cast iron, grooved in the direction of the axis. Since the beaters, or ribs, come quite close to these ribs, an ear of corn or other grain cannot well pass through them without being flattened. After being unbound, the sheaves of corn are spread upon a slanting table, and in some machines are drawn in between two iron rollers, one of which is fluted and the other plain. The motion of these rollers is slow, while that of the cylinder is rapid. As the straw comes through, the beaters act upon it, and thrash out most of the corn; that which remains is carried in between the beaters and the fluted cases, and on making half a revolution, all the grain has been beaten or rubbed out. It falls on a shaker, which allows the grain to pass through, but tosses off the straw. In England, *T.*-machines worked by steam-power have been erected on very large farms; and travelling steam-machines thrash out the largest quantity of the corn grown in that country. In the U. States, innumerable *T.*-machines have been patented, in which the spiked cylinder is generally employed. Lately, however, several patents have been obtained, in which a different device is employed for the same purpose. This device is a system of rotating flails or beaters, to which the head only of the sheaf is presented, by which means the grain is separated from the straw without bruising the latter.

Thread, fine linen or cotton yarn, made thicker, or at least more dense, than for weaving. All fibres that can be spun into yarn for weaving can also be spun and twisted into *T.* for sewing, lace-making, hosiery, etc. In factory language, *T.* always means two or more yarns twisted one around another. Lace *T.*, which is usually very fine, consists of only two yarns; but sewing *T.* comprises two or more. The *T.-frame* is a kind of throstle machine (see SPINNING), with spindles, fliers, and rollers. The yarns are doubled or trebled, and then twisted round each other in a direction contrary to the twist of each individual yarn; this is the plan adopted in making cables or thick ropes, and for a similar reason, — to give increased strength. The *T.*, when made by this doubling and twisting, is tied up into hanks. According to the material of which it is made, and the purpose to which it is to be applied, it is either bleached and dyed or not. Very beautiful apparatus is then employed to wind the *T.* (if for sewing) upon *reels* or into *balls*. There may be from 30 to 300 yards in each reel, and from 16 to 600 balls to 1 lb. The little gold-printed labels on the ends of the reels and balls have adhesive gum at the back, and are stuck on by children. A very delicate and beautiful machine is employed to wind the thread on the reels, giving to the threads a remarkable parallelism of arrangement. *Imp.* duty, according to material.

Threadbare, articles of cloth that have become shabby or worn-out.

Thread-Lace, lace made of linen-thread; not silk or blonde-lace.

Thread-Paper, thin strips of paper for wrapping skeins of thread in.

Threepenny-Piece, a British silver coin, the fourth part of a shilling.

Throstle. This little implement, so important in textile manufactures, is described in connection (or rather contrast) with the *mule* frame, under SPINNING.

Through-Ticket, a passenger's paid ticket for the whole journey intended to be travelled.

Through-Train, one that proceeds over the whole line of railroad between certain main termini.

Thrower, a workman in a pottery.

Thrown-Singles, a name in the silk-trade for silk wound, cleaned, and thrown, fit to be used in the weaving of ribbons and common silks.

Throwster, a maker of organzine; one who twists singles of silk into a contrary direction to that in which they had previously been wound.

Thrum, coarse rope-yarn; the ends of weavers' threads; to insert yarn, etc., into a piece of canvas, as in making a rope-mat.

Thrustings, a name in the cheese factories for the white whey extracted after the curd has been salted.

Thumb-Blue, a name for small knobs of indigo used by washerwomen to give a slight tinge of blue to linen.

Thwarts, the cross planks of a boat on which the rowers sit.

Thyme, dwarf shrubs, the *Thymus vulgaris* and *T. serpyllum*, of agreeable, strong, and penetrating odor, yielding a volatile oil, and much used in Europe as an ingredient in culinary seasoning. *Imp.* (red or white oil) free.

Tiara, a diadem; a high head-dress.

Tical, a Chinese weight of rather uncertain character, but usually about ½ lb. avoirdupois. — As a money of account equal to $1.62.

Tick, TICKING, a closely woven cloth used to contain the feathers or other material of beds.

Ticket, a piece or slip of paper; a piece of paper, or card-board, which gives the holder a right of admission to some place; a piece of paper or writing acknowledging some debt, or a certificate that something is due to the holder; a piece of paper bearing some number in a lottery, which entitles the holder to receive such prize as may be drawn against that number; a marked card or slip of paper put upon goods to indicate the price, etc.; a label.

Ticklenburghs, a coarse, mixed linen fabric made for the West India market.

Tickler, a prong used by coopers to extract bungs from casks.

Tidal Basin, a dock that is filled upon the rising of the tide.

Tides, the alternate rise and fall of the waters of the ocean. The moon is the principal agent in the production of the tides; but they are modified, both with respect to their height and the times at which they happen, by the action of the sun. The theory of the tides was first satisfactorily explained by Kepler, A.D. 1598; but the honor of a complete explanation of them was reserved for Sir Isaac Newton, who laid hold of this class of phenomena to prove universal gravitation, about 1683.

The attractive force of a body on a distant particle of matter varying inversely as the square of the distance, the particles of the earth on the side next the moon will be attracted with a

greater, and those on the opposite side with a smaller force, than those which are situated intermediately. The gravitation toward the earth's centre of the particles nearest the moon will therefore be diminished, and consequently, if at liberty to move among themselves, they will rise above the general level. In like manner, the moon's attraction on the most distant particles being less than on the central ones, their relative gravitation toward the centre will also be diminished, and the waters will consequently be heaped up on the side of the earth which is turned away from the moon. Hence, if the earth was at rest, the ocean would take the form of an oblong spheroid, with its longer axis passing through the attracting body; and it may be shown from theory that the spheroid would be in equilibrium under the influence of the moon's attraction, if the longer semi-axis exceeded the shorter by about 58 in. But in consequence of the rapid rotation of the earth about its axis, the spheroid of equilibrium is never fully formed; for before the waters can take their level, the vertex of the spheroid has shifted its position on the earth's surface, in consequence of which an immensely broad and very flat wave is formed, which follows the motions of the moon at some interval of time. In the open sea the time of high water is, in general, from 2 to 3 hours after the moon's transit over the meridian either above or below the horizon. The tidal wave, it is to be observed, is entirely different from a current: the particles of water merely rise and fall; but except when the wave passes over shallows, or approaches the shore, there is little or no progressive motion. The waters of the ocean are affected in a similar manner by the action of the sun, under the influence of which they have a tendency to assume at every instant the form of an elongated spheroid; but although the attractive force of the sun is immensely greater than that of the moon, yet, by reason of the greater distance of the sun, the *difference* of the effect on particles situated on opposite sides of the earth (on which difference the phenomena depend) is very much less. The solar tides are therefore comparatively small with respect to the lunar tides, and, in fact, are never perceived as distinct phenomena, but become sensible only from the modifications which they produce in the heights and times of those which primarily depend on the moon. At the syzygies, when the sun and moon come to the meridian together, the tides are, *ceteris paribus*, the highest; at the quadratures, or when the sun and moon are 90° distant, the tides are least. The former are called *spring tides*, and the latter *neap tides*. Although we are not in possession of data to enable us to compute the exact height either of the spring or neap tides, yet their relative heights in the open ocean probably correspond very nearly to the ellipticities of the spheroids of equilibrium that would be formed under the action of the two bodies exerted separately. Now the ellipticity of the aqueous spheroid formed by the moon's action is about 5 ft., and the ellipticity of that formed by the sun's action about 2 ft.; therefore, the spring and neap tides being the sum and difference of the separate effects, the average spring tide will be to the average neap in the ratio of about 7 to 3.

The apparent time of high water at any port, in the afternoon of the day of new or full moon, is what is usually called the *establishment of the port*. The two tides immediately following one another, or the tides of day and night, vary, both in height and time of high water, at any particular place with the distance of the sun and moon from the equator. As the vertex of the tide wave always tends to place itself vertically under the luminary which produces it, it is evident that, of two consecutive tides, that which happens when the moon is nearest the zenith or nadir will be greater than the other; and consequently, when the moon's declination is of the same denomination as the latitude of the place, the tide which corresponds to the upper transit will be greater than the opposite one, and *vice versa*, the differences being greatest when the sun and moon are in opposition, and in opposite tropics. This is called the *diurnal inequality*, because its cycle is one day; but it varies greatly at different places, and its laws, which appear to be governed by local circumstances, are very imperfectly known. We have now described the principal phenomena that would take place were the earth a sphere, and covered entirely with a fluid of uniform depth. But the actual phenomena of the tides are infinitely more complicated. From the interruption of the land, and the irregular form and depth of the ocean, combined with many other disturbing circumstances, among which are the inertia of the waters, the friction on the bottom and sides, the narrowness and length of the channels, the action of the wind, currents, difference of atmospheric pressure, etc., great variation takes place in the mean times and height of high water at places differently situated; and the inequalities above alluded to, as depending on the parallax of the moon, her position with respect to the sun, and the declination of the two bodies, are, in many cases, altogether obliterated by the effects of the disturbing influences, or can only be detected by the calculation and comparison of long series of observations.—The rate of motion of waves for different depths is as follows: at 10 ft., 12.2 m. an hour; 60 ft., 30 m.; 100 ft., 38.7 m.; 1,000 ft., 122.3 m.; 6,000 ft., 299.5 m.

Tide-Gauge, an instrument, sometimes self-registering, used on coasts and harbors for ascertaining the rise and fall of the tide, thus indicating the depth of water, and enabling vessels to enter tidal harbors at the proper time.

Tide-Tables, an almanac which records the time of high water, etc., for each day.

Tidies, crochet covers; cases for furniture.

Tie, a fastening; the knot of a cravat.

Tien-Tsin. See China.

Tier, a row or rank; a range of anything, as of casks; the coils or fakes of a cable, etc.

Tierce, a measure of liquid capacity of 42 gals. The name is frequently applied to casks of a larger capacity than a barrel, containing rice, hams, meats, or other articles.

Tiffany, a species of gauze or thin silk.

Tigers'-Skins, the skins of this beast of prey are used for hearth and carriage rugs, but the annual imports are small.

Tights, close-fitting pantaloons.

Tilbury, an open carriage on two wheels.

Tiler, a man whose occupation is to cover buildings with tiles.

Tiles. There are wide differences in the color and qualities of tiles, according as they are used for coarse or for ornamental purposes. We treat here of the rougher kinds, used for tiling roofs and for draining land. For ornamental tiles see Encaustic Tiles.

Manuf.—The clay, purer and stronger than for common bricks, is *weathered*, or exposed to the weather for some time, to open the pores and separate the particles; then *mellowed*, or covered with water in pits; then *tempered*, or ground to the proper consistency in a pug-mill. The moulder then sets to work. Roofing tiles are *plain tiles* if quite flat, and *pan tiles* if curved in surface. The moulds are simple in form; and the moulder, with his hands kept constantly wetted, easily presses the soft, yielding clay into them, aided by a few wooden tools and implements. Fine coal-dust is used to prevent the clay from adhering to the moulds. One man can mould 1,200 to 1,500 in a day. After drying in the open air, the tiles are baked. A *tile-kiln* is something like a glass-house, having a central oven or furnace surrounded by a conical structure, diminishing to a chimney at the top. The interior of the oven is packed with tiles, set up in a particular way; the fires are lighted and the baking is continued until the usual brick-red color is produced. *Draining-tiles*, *draining-pipes*, *chimney-pots*, and *garden-pots* are all made of clay differing but little in character from that employed for roofing tiles; and the processes of manufacture are nearly the same so far as concerns draining-tiles. For draining-pipes, however, a kind of mould is needed, through which the clay is forced by heavy pressure, the size and shape of the mould depending on the kind of pipe to be produced. Sometimes machines are employed to make the pipes, in the way described under Brick-Making, and also to make the *hollow bricks* now so advantageously used. In making circular chimney-pots and garden-pots, the potter's wheel comes into requisition, as described in Pottery.

Tile-Tea, a kind of flat cake tea, of much solidity, made in China, and taken to Kiachta, where it is sold to the Armenians and Tartars, who distribute it to the Caucasian provinces and Eastern Siberia. The Kalmucks, Kirgheses, and Burats consume the greater part of it. It is prepared in a different manner from common tea, being stewed with milk, butter, salt, and herbs, constituting rather an article of food than a dietetic beverage.

Till, a counter-drawer or desk receptacle for money received.

Tillage, husbandry; agriculture; land under cultivation.

Tiller, a bar of wood or iron placed in the rudder to move it for steering the vessel.

Tiller-Ropes, the connected ropes or chains running from the tiller of the rudder to the steering-wheel.

Tilt, an awning or cover for a boat or cart.—The leaning forward of a cask.

Tilted-Steel, blistered steel drawn down into smaller bars and beaten, for the purpose of form-

ing (after further heating, welding, and drawing) shear steel.

Tilting, Tilt Hammer. A *tilt* is the name often given to the building in which *tilting* is carried on by means of a *tilt hammer*. This hammer is a kind of helve or shingling hammer; but, by a peculiar arrangement of levers and cogs, the head of the hammer is made to fall much more rapidly, even so many as 360 strokes per minute. Such a hammer requires a very firm foundation and strong framework to resist the impact; and when several of them are at work in one building, the noise is tremendous, and the ground all around trembles; for every hammer, weighing 150 to 200 lbs., is giving its 300 or 400 blows a minute. The purpose of tilting is noticed under Steel, etc.

Timbales, a French name for kettle-drums.

Timber. There is no other distinction between *timber* and *wood* than this, — that timber trees comprise the larger kinds, yielding pieces of wood wide and thick as well as long. As a general rule all the wood employed in engineering and building is called timber. In England timber is bought and sold by the *load*, which consists of 40 cubic ft. of unhewn, or 50 ft. of square timber, 600 sq. ft. of 1-in. plank, 200 sq. ft. 3-in. plank, etc. These several *loads* are supposed to weigh 1 ton. In the U. States timber of all kinds is almost invariably sold by the ft. See Wood.

Fig. 475. — Timothy-Grass.

Timber-Merchant, a wholesale dealer in timber; one who keeps a timber yard or wharf.

Timbers, the upright pieces of a ship's frame.

Timber-Ship, a ship or vessel constructed with special reference to carrying timber.

Timber-Yard, a place where timber is deposited and kept for sale.

Timbre, a legal quantity or trade number of 40 or 50 small skins, packed between two boards; in some skins, however, the timbre counts to 120. — In France, a stamp.

Time-Bargain, a contract for the sale or purchase of merchandise, or of stock in the public funds at a certain time. Sometimes these bargains are mere gambling transactions, carried on from time to time, by the mere payment of the difference between the stipulated price and the actual price of the day fixed for its pretended delivery.

Time-Detector. See Detector.

Time-Indicator. See Chronograph.

Time-Keeper, a person appointed to watch the departure of vehicles. — Also a chronometer; a watch, etc.

Time-Table, a register of the time of high water, and of the departure of steam-boats, railway trains, etc.

Timothy-Grass, a pasture grass, the *Phleum pratense* (Fig. 475). Quantities of this small grass-seed are exported from this country. There are several varieties of Timothy, which are extensively cultivated as spring grass for fodder, and are considered very valuable herbage.

Timwhiskey, a heavy, lumbering, low-wheeled carriage.

Tin [Fr. *fer blanc;* Ger. *Blech, Weissblech;* It. *latta, banda stagnata;* Sp. *hoja de lata*], a white, brilliant metal. Its surface is but slowly impaired by exposure to the atmosphere, nor is it oxidized even by the combined agency of air and moisture. Its malleability is very considerable. In ductility and tenacity it is inferior to several metals. It is soft and inelastic. Sp. gr. 7.2. Fusing point, 442° F. It is employed, when in a liquid state, in *tinning* or covering iron and copper plates, to protect them from rust; also in the fabrication of a great variety of utensils. Alloyed with lead it forms pewter. It is likewise used in the process of enamelling; in silvering looking-glasses; by dyers, when solved, to heighten red colors; and for many other purposes.

T. is rather a scarce metal: it is principally found in primitive rocks, and occurs disseminated in them, and in beds, but principally in veins, mostly in a state of crystallization, being rarely compact, and is frequently accompanied by other minerals. The ore from which it is chiefly obtained is an oxide of the metal. *T.* is found abundantly in Cornwall and the W. part of Devonshire, England; it is also procured in Germany, Bohemia, and Hungary, in Europe; in Chili and Mexico, in America; and in Malacca and Banca, in Asia. Crystals of the oxide of *T.* have been found in several parts of the U. States, but though the mines of California seem promising, we believe that *T.* has not been worked profitably up to the present time. All the *T.* imported into this country comes from England, British Indies, the Dutch East Indies (Malay Straits and Banca), and from Australia. The English *T.* comes usually in pigs of 28, 56, and 84 lbs. per pig; the Straits *T.* in pigs from 75 to 100 lbs.; and Banca in pigs of 70 lbs. Bar and strip *T.* in casks of 224 lbs., or 448 lbs. *T.* plates are distinguished as *charcoal* and *coke tin plates;* of the latter there are three qualities, — best, medium, and common. The numeral marks of the boxes — IC, IX, IXX, etc. — denote the weight or thickness of the sheet according to the wire gauge; that is, IC always and only means that the sheets of *T.* are equal in thickness to No. 29 wire gauge; IX to No. 27 wire gauge, etc. Our imports of *T.* for the year 1879 were as follows: *T.* in bars, blocks, or pigs, 143,512 cwt., valued at $2,312,297 (of which 81,154 cwt. was from England, 41,252 cwt. from British India, 8,930 cwt. from the Dutch East Indies, and 6,148 from Australia); *T.* in plates (almost entirely from England), 2,469,081 cwt., valued at $10,147,460; other manuf. of *T.*, valued at $54,107. *Imp.* duty: in bars, blocks, or pigs, and grain *T.*, free. — Manuf. of *T.*, n. o. p. f., 35 per cent; in plates or sheets, and tern and tagger's *T.*, $1\frac{1}{10}$ cts. per lb.; *T.* foil, 30 per cent; *T.* plates, galvanized, coated with any metal by electric batteries, 2 cts. per lb.; the same, galvanized otherwise than by electric batteries, $2\frac{1}{2}$ cts. per lb.; muriate and oxide of *T.*, 30 per cent; tern and tagger's *T.*, 15 per cent.

Tincal, crude borax; borate of soda, imported from India in an impure state, and covered by a soapy matter. When purified, it forms the refined borax of commerce, and is used as a flux in glass-making and in soldering.

Tin Can, the common name for cans made from tin plates or tinned iron, used for vegetables, meats, fruits, oils, etc. They are extensively manufactured in this country, and millions of them are annually exported. On exportation, a drawback is allowed on the quantity of tin used, such quantity to be ascertained by computation from the superficial measurement of the cans, with the addition of one twentieth allowed for the seams in joining the plates.

One of the great improvements in this branch of business was the tin can of Masury, in 1859, in which he made a portion of the cover of very thin metal, which could be readily cut through with a knife. 10,000,000 of these cans are made yearly, 10,000 being used daily by the Borden Condensed Milk Company. The invention is largely used in the paint trade, as it enables paints to be put up in liquid form, ready for use, thereby saving the painters time and trouble in mixing paint. — *E. H. Knight.*

Tin Canister, a case for holding sugar, coffee, spices, or dry goods.

Tincture, in pharmacy, an infusion of the various drugs of the materia medica in spirit of wine

or proof spirit, for the sake of extracting their more active principles.

Tinder, an inflammable substance; charred lint or rags, etc. German tinder is the soft amadou. See AGARIC.

Tines, the iron spikes or teeth of scarifiers, harrows, forks, and other agricultural implements and machines.

Tin-Foil, very thin sheets of bar tin alloyed with lead, used for lining tea-chests, boxes, etc.; as wrappers for chocolate, chewing tobacco, etc.; also, with the addition of mercury to cover the surface of glass in the production of mirrors or looking-glasses.

Tin-Glass. See BISMUTH.

Tinker, a solderer and mender of old pots, kettles, etc.

Tin-Kettle, a boiler of tinned iron, with a spout.

Tin-Liquor, a solution used by dyers, prepared by digesting tin filings in hydrochloric and nitric acids, to each pound of which about two ounces of common salt are added.

Tinning, the process of coating iron with tin.

Tin Plates, sheets of iron of different dimensions and strength, scaled, cold-rolled, immersed in an acidulous lye, and after undergoing other preparations, coated with molten tin. They are used for lining packing-cases, making tin cans, domestic utensils, etc.; also for roofing churches and dwelling-houses. See TIN.

Tinsel, a kind of shining metallic plate or cloth, either of gold or silver.

Tin-Smelter, one who roasts tin ore and prepares the pure metal.

Tin-Smith, a worker in tin.

Tint, a shade; a hue of color.

Tin-Ware, articles made from tin plates.

Tip, the point or top of anything, as a horn tip, a shoe tip. — Rubbish thrown from a quarry. — A gilder's tool, made of camel's hair, and used in transferring gold-leaf from the cushion to the sized surface of the work.

Tire, the iron hoop or band which binds all the felloes of a wheel closely together.

Tiretaine, the French name for linsey-woolsey.

Tire-Woman, a milliner; a dresser in a theatre.

Tisanne de Champagne. See CHAMPAGNE WINES.

Tisserand, a French weaver.

Tissue, a texture or fabric. — Cloth interwoven with gold.

Tissue-Paper, a very thin unsized paper for wrapping and packing fine articles.

Titler, a large truncated cone of refined sugar.

T-Joint, the union of three joints in a pipe, resembling the letter T.

Toaster, a metal pan with hooks, for cooking bread, bacon, cheese, etc., before the fire.

Toasting-Fork, an implement for holding bread, etc., before a fire to bake; either a twisted metal prong, or one with a telescope or sliding handle.

Toast-Rack, a stand for a table, of metal or earthenware, with partitions for placing slices of dry toast in.

Tobacco. See this word in the Appendix.

Tobacconist, a wholesale or retail licensed dealer in tobacco.

Tobacco-Pipe. See SMOKING-PIPE.

Tobacco-Planter, a grower of tobacco.

Tobacco-Pouch, a pocket-case of skin, India-rubber, or leather, for holding tobacco for the use of a smoker.

Tobine, a stout twilled silk.

Tod, an English measure of weight, used by dealers in wool, equal to 2 stones of 14 lbs. each; 6½ tods make one wey, and 2 weys one sack.

Toddy, palm wine obtained from the sap of the *Arenga saccharifera*. — A name for whiskey-punch in Scotland.

Toggle, a pin placed through a rope, strap, or bolt; a button.

Toggle-Joint, an elbow or knee joint.

Toile [Fr.], linen cloth.

Toilet, a bag or case for night-clothes. — A cotton cover for a dressing-table.

Toilet-Glass, a looking-glass for a dressing-table.

Toilet-Pail, a tin pail for holding slops in a bedroom.

Toilet-Set, TOILET-SERVICE, earthenware and glass utensils for a dressing-room.

Toilette [Fr.], a dressing-table; an ante-room for dressing; the personal attire of a female.

Toilinet, a kind of German quilting; silk and cotton warp with woollen weft.

Toison [Fr.], a fleece.

Tokay. See HUNGARY WINES.

Token, a piece of money current by sufferance, and not coined by authority. — In printing, 10 quires of 25 sheets of *perfect* paper, or 250 impressions.

Toledo, a thriving city of Ohio, the port of entry of the Miami district, is situated in lat. 41° 39′ N., lon. 83° 32′ W., on the Maumee River, 5 m. from its mouth in Maumee Bay, 8 m. from the W. end of Lake Erie, 92 m. W. of Cleveland, and 53 m. S. S. W. of Detroit. It has a fine harbor, the water of the river being of sufficient depth to accommodate the largest vessels; it is besides the centre of 12 or 13 lines of railroad which concentrate at an immense union depot. *T.* has an important trade in live-stock, lumber, hides, wool, iron, cotton, tobacco, whiskey, etc.; but its chief items of receipt and shipment are grain and flour. There are 11 elevators, with storage for above 4,000,000 bushels of grain, and capacity to receive and ship 780,000 bushels daily. The aggregate deliveries of grain and flour, which were 16,141,990 bushels in 1868, reached to 35,300,220 in 1871, to 39,304,891 in 1874, and to upwards of 50,000,000 in 1879. *T.* has numerous and important manufacturing establishments, among which must be quoted the largest wagon-works in America, 5 flouring mills, 5 lumber mills, 6 iron foundries, 14 planing mills, etc. There are 6 national banks, 3 savings banks, and several savings and loan associations. The value of imports from Canada for the year 1879 were $3,081; of exports, $1,986,262. The entrances in the foreign trade were 249 vessels of 72,890 tons; clearances, 262 vessels of 75,473 tons; entrances in the coastwise trade, 1,820 vessels of 560,900 tons; clearances, 1,809 vessels of 550,261 tons. In 1880 there were 62 vessels of 11,275 tons in aggregate belonging to the district. Pop. of *T.* 60,000.

Toledo, a fine sword made in the Spanish city of Toledo.

Toledo, Peoria, and Warsaw R. R. runs from Warsaw, Ill., to State line, Ind., 227.40 m.; branch for La Harpe, Ill., to Burlington, Ia., 19.60 m.; total length of road, 247 m. This Co., located at Peoria, Ill., was chartered in 1863, and the road opened in 1868. Cap. stock, $5,700,000; funded debt, $6,450,000; floating debt (as reported in 1874), $1,095,178, total stock, bonds, and debt, $13,243,178. Cost of road and equipments, $12,720,133. The interest on funded debt, being not paid at end of 1873, was placed and has been since in the hands of a receiver.

Toll, a portion of goods, money, etc., taken or exacted as a tax, impost, or duty; a tax paid or duty imposed for some liberty or privilege; especially, a duty imposed on travellers and goods passing along public roads, bridges, over ferries, etc. It is also used to indicate the payment to the corporation of a town, or to the owner of a market or fair, upon sale of things tollable. — A certain quantity of grain taken by a miller as compensation for the grinding of the remainder.

Tolu. See BALSAM.

Tomato, LOVE-APPLE, one of the most popular of vegetables, the *Lycopersicum esculentum*, the fruit of which is eaten raw as a salad, stewed, boiled, baked, and as an ingredient in soups, stews, and sauces. It is also used to make a popular catsup; and is pickled, preserved, and put up in tin cans.

Tombac, an East-Indian alloy of copper and zinc, or a species of brass with excess of zinc; when arsenic is added, it forms *White Tombac*. It is used for cheap jewelry.

Tomin, a Spanish weight for gold and silver, the sixth part of the ochava; for gold, 8.875 grs.; for silver, 9.245 grs.

Tommy Shop, a rag or waste dealer's.

Tompion, a bung or plug for the mouth of a cannon. — The plug is a pipe or organ-pipe, which is adjusted towards or from the mouth-piece to modulate the tone.

Tompon, the inking-pad of the lithographic printer.

Tom-tom, a kind of kettle-drum, generally used in the East, and of which there are several kinds, usually made of jack-wood, and covered with deer-skin, from which the hair has been removed. The skin is laid on in a wet state and dried in the sun.

Ton [Fr. and Ger. *Tonne*], the principal ponderous commercial weight, which varies considerably in different countries, for weights or measurement goods. In the U. States the ton is 2,240 lbs; in the States of New York and Maryland, by statute, 2,000 lbs; though by commercial usage foreign merchandise and coal by the cargo, in both these States, is 2,240 lbs.

The ton of freight or merchandise varies with the article and the locality from whence shipped, different rules being laid down by different Chambers of Commerce. According to rules of the New York Chamber of Commerce, the following quantities of goods constitute a ton: 6 cwt. ship bread in casks; 7 cwt. in bags; 8 cwt. in bulk. — 6 barrels of beef. pork, tallow, pickled fish, pitch, tar, and turpentine. — 1,568 lbs. coffee in casks; 1,830 do. in bags. — 1,120 lbs. cocoa in casks; 1,307 do. in bags. — 8 bbls. of flour. — 12 cwt. of dried codfish in bulk, and 12 cwt. of dried codfish in casks of any size. — 20 cwt. of pig and bar iron, potashes, sugar, logwood, fustic, Nicaragua wood, and all heavy dye-woods, rice, honey, copper ore, and all other heavy goods. — 952 lbs. of pimento in casks, 1,110 do. in bags. — 200 gallons (wine measure), reckoning the full contents of the casks, of oil, wine, brandy, or any kind of liquors. — 22 bushels of grain, pease, or beans in casks; 36 bushels of do. in bulk. — 36 bushels of European salt. — 31 bushels of salt from the West Indies. — 29 bushels of sea coal. — 40 feet (cubic measure) of mahogany, square timber, oak plank, and other boards, beams, furs, peltry, beeswax, cotton, wool, and bale goods of all kinds. — 1 hogshead of tobacco — 10 cwt. of dry hides — 8 cwt. of China raw silk. — 800 cwt. of green tea. In Great Britain, the legal ton for weight is usually 20 cwt. and 2,240 lbs., but in long weight it is 2,400 lbs. A ton of flour, in commerce, is 8 sacks or 10 barrels; a ton of potatoes, 10 bushels. In Cornwall, the miner's ton is 2,352 lbs. — The French legal ton for heavy weights contains 1,000 kilogrammes; in Germany, Spain, etc., it is 2,000 lbs. — In the measurement of a ship, the ton is reckoned as 40 cubic feet.

Tönde, a Danish weight. See DENMARK.

Tonelada, a Portuguese liquid-measure, equal to 227¼ English wine-gallons, and containing 52 almudes. — Also the name of the Spanish tun.

Tong-King. See COCHIN-CHINA.

Tongs, an instrument of metal, consisting of two parts or long legs or shafts, joined at one end, by which tight hold is taken of anything, as of coals in the fire, heated metals, etc.

Tongue, the clapper of a bell. — A projection, as of a buckle or stock. — The pointer of a balance. — The single shaft or pole which, in two-horse vehicles, is attached to the fore-carriage, and is the means of guiding and drawing. — An organ in the mouth of a quadruped, many of which are used for food, fresh, salted, or dried and smoked; as pigs' tongues, sheep's tongues, calves' tongues, ox and reindeer's tongues, etc.

Tonics, strengthening medicines.

Tonka-Bean. See TONQUIN-BEAN.

Tonnage, the internal measurement of a ship, representing the number of tons of cargo she will carry. *T.* is estimated by bulk, or by weight; a ton by bulk being equal to 40 cubic feet; and a ton by weight equalling 20 cwt.

By the Act of May 6, 1864, vessels are, for the purpose of ascertaining their *T.*, divided into six classes, according to length, those in each class being divided into a certain number of equal parts, or transverse sections, to which different values are assigned in computing the total *T.* of the vessel; the actual depths between decks are measured and taken as factors, and any closed-in space on or above the upper deck, and capable of receiving cargo, etc., is included in the measurement. The dimensions are all taken in feet and decimals of a foot, and the number 100 is used as the final division for ascertaining the capacity of the ship in tons.

Class 1. Vessels under 50 feet long, divided into 6 equal parts.
Class 2. Vessels 50 to 100 feet long, divided into 8 equal parts.
Class 3. Vessels 100 to 150 feet long, divided into 10 equal parts.
Class 4. Vessels 150 to 200 feet long, divided into 12 equal parts.
Class 5. Vessels 200 to 250 feet long, divided into 14 equal parts.
Class 6. Vessels over 250 feet long, divided into 16 equal parts.

The details for making the measurements and calculations are too long to be inserted here, but may be found in "Revised Statutes of the United States," 1875, pp. 803-806. The rule adopted in England by the Merchant Shipping Act of 1854 is essentially the same as that established in this country; the measurements are made in feet and decimals, and the principles of calculation are identical. Vessels are divided as follows: —

Not exceeding 50 feet in length, into 4 parts.
Not exceeding 120 feet in length, into 6 parts.
Not exceeding 180 feet in length, into 8 parts.
Not exceeding 225 feet in length, into 10 parts.
Over 225 feet in length, into 12 parts.

In steam-vessels, the length, breadth, and height of the engine-room are multiplied together, the product divided by 100, and the result deducted from the gross *T.* The space occupied by a propeller-shaft is considered as a part of the engine-room. It should seem that the American method, employing, as it does, a greater number of divisions for the same length, should be slightly more accurate than the English, or afford at least, on the average, a somewhat nearer approximation to the true capacity of a vessel; either, however, may be relied on generally as coming within 4 or 5 per cent of the truth This difference may, however, in extreme cases, amount to 10 or 12 per cent — *E. H. Knight.* — The term *T.* is also applied to the aggregate amount of shipping belonging to a country, estimated by tons. See SHIPPING.

Tonne. See TON.

Tonnerre. See BURGUNDY WINES.

Tonquin-Bean, the fruit or seed contained in the capsules of *Dipterya odorata*, a large tree growing in Brazil. Its odor somewhat resembles that of the vanilla. It was formerly largely used for scenting snuff, but now chiefly for adulterating the extract of vanilla. *Imp.* free.

Tool, a mechanical instrument of any kind for working with.

Tooling. See BOOKBINDING.

Tooth. See TEETH.

Tooth-Brush, a small bristle-brush for washing and scrubbing the teeth.

Tooth-Forceps, dental instruments used for extracting teeth.

Toothing, irregular projecting bricks left standing at the end of a wall or building to form a union.

Toothing-Plane, a plane in which the iron has a serrated edge and is placed upright. It is used for working on veneers.

Tooth-Pick, a sharpened piece of wood, a shaped piece of bone, quill, or tortoise-shell, used to remove obstructions between the teeth.

Tooth-Powder, a dentifrice, of which various kinds are made.

Top, a name among cloth-manufacturers, etc., for the combed wool ready for the spinner, from which the "nolls" or shorts and dust have been taken out. — A platform at the head of the lower masts of a ship, for the convenience of seamen working aloft. — A child's spinning toy.

Topaz [Fr. *topaze;* Ger. *Topas;* It. *topazio;* Sp. *topacio*], an ornamental stone, in considerable estimation. It is a silicate of alumina, containing fluorine, and occurring massive, in rounded pieces, and crystallized in prisms; sp. gr. 3.5. *T.* is chiefly obtained in Minas Novas in Brazil, and the Ural Mountains; but it is also found in the German tin mines, the Mourne Mountains in Ireland, etc.

Yellow T. — In speaking of the *T.*, a gem of a beautiful yellow color is always understood; it is wine-yellow of different degrees of intensity; and the fuller and deeper the tinge, the more the stone is esteemed. In hardness it yields to the spinelle. The yellow sapphire or Oriental *T.* is of very little value in commerce. There are few gems more universal favorites than the yellow *T.*, when perfect; the rich warm tone of its color, the vivacity of its lustre (which it retains even by the side of the diamond), and its large size, compared with many others, are characteristics which deservedly entitle it to distinction; it bears accordingly a high price when of good quality. It is chiefly employed for necklaces, ear-drops, bracelets, etc., in suit. No little skill and taste are required in cutting and duly proportioning this gem; the table should be perfectly symmetrical, and not too large; the bizel of sufficient depth, and the collet side should be formed in delicate steps. It works easily on the mill, and the lapidaries are in general tolerably well acquainted with it; yet it is uncommon to meet with one well cut. The yellow *T.* varies in price according to its beauty and perfection. A superlatively fine stone, perfect in color and workmanship, sufficiently large for an armlet, or any other ornament, weighing nearly 80 carats, was sold for $500. *T.* have become more common since our intercourse with Brazil; consequently they are less in demand, and lower in price. They are not now in vogue as they were 75 years ago, and a fine stone can at present be had for a few dollars. — *Pink T.* is made from the brownish yellow, which, when of intense color, is put into the bowl of a tobacco-pipe or small crucible, covered with ashes or sand; on the application of a low degree of heat, it changes its color from a yellow to a beautiful pink. This is performed with little hazard; and if the color produced happens to be fine, the price is much augmented. — *Red T.* This beautiful gem, which very seldom occurs naturally, is of a fine crimson color, tinged with a rich brown; it is extremely rare, and generally taken to be a variety of ruby. Its price, from its scarcity, is quite capricious; it has an exquisite pleasing color, very different from the glare of the artificial pink *T.* — *Blue T.* is also a beautiful gem, of a fine celestial blue color. It has occurred of considerable magnitude, sometimes weighing, when cut and polished, 1¼ oz. Smaller specimens are not uncommon, and when light-colored are often taken for aqua-marinas, from which they may always be distinguished by their greater weight and hardness, etc. — *White T.* is familiarly called *Minus Nova.* It is a beautiful pellucid gem, and is used for bracelets, necklaces, etc. It possesses greater brilliancy than crystal; and from its hardness has been used to cover paste, etc., and to form doublets.

Top-Cloth, tarred canvas to cover hammocks when stowed away.

Topping-Lift, a hoisting rope for raising the end of a boom or yard in a ship.

Toral, cakes of unbleached yellow wax.

Torch, a large taper, a flambeau or blazing brand.

Torins. See Burgundy Wines.

Tornado [Sp.], a violent hurricane or gust of wind, which, arising suddenly from the shore, veers round to all points of the compass, and indeed has been described as blowing from all points at once. Tornadoes are usually accompanied by thunder-storms, and are generally of short duration. They are frequent in the Chinese seas and the West Indies.

Toronto, a flourishing city and port of entry of Canada, capital of prov. Ontario, on the N. shore of Lake Ontario, 310 m. S. W. of Montreal, in lat. 43° 39′ N., lon. 79° 21′ W. The bay S. of the city is a beautiful sheet of water, separated from the main body of Lake Ontario, except at its entrance, by a long narrow strip of sandy beach, the S. W. termination of which is known as *Gibraltar Point.* *T.* has railroad communication with the U. States and with the principal points of Canada by means of the Grand Trunk, the Great Western, the Northern, the Toronto, Grey, and Bruce, and the Toronto and Nipissing lines. This city has several extensive iron-foundries, railway-car building shops, rolling-mills, several breweries, and a mammoth distillery, carriage factories, tanneries, soap-works, spice-mills, machine-shops of all kinds, boot and shoe factories on an extensive scale, etc. There are 13 banks represented in the city, 6 of which have their head offices here. Pop. 70,000.

Torpedo. The notion of destroying ships or other structures by explosions of gunpowder, contained in vessels made to float on the surface of the water, or submerged beneath it, is not of very modern origin. Two hundred and fifty years ago the English tried "floating petards" at the siege of La Rochelle. During the American War of Independence similar contrivances were used against the British, and from time to time since then "torpedoes," as they were first termed by Fulton, have been employed in warfare in various forms; but up to quite a recent period the use of *T.* does not appear to have been attended with any decided success, and it is probable that but for our Civil War we should have heard little of this invention. It is said that 39 Federal ships were blown up by Confederate *T.*, and the official reports own to 25 having been so destroyed. It has been well remarked that the *T.* plays the same part in naval warfare as does the mine in operations by land. This exactly describes the purpose of the *T.* where it is used defensively, but the comparison fails to suggest its capabilities as a weapon of offence. There are few occasions where a mine is made the means of attack, while the *T.* readily admits of such an employment, and used in this way, it may become a conspicuous feature of future naval engagements. Many forms of this war engine have been invented, but all may be classified, in the first place, under two heads: viz., stationary *T.*, and mobile or offensive *T.*; while independent distinctions may be made according to the manner of firing the charge; or, again, according to the mode of determining the instant of the explosion. The stationary *T.* may be fixed to a pile or a raft, or attached to a weight; the offensive *T.* may be either allowed to float or drift against the hostile ships, or it may be propelled by machinery, or attached to a spar of an iron-clad or other vessel. The charge may be fired by a match, by percussion, by friction, by electricity, or by some contrivance for bringing chemicals into contact which act strongly upon each other, and thus generate sufficient heat to ignite the charge. The instant of explosion may be determined by the contact of the *T.* with the hostile structure (in which case it is said to be "self-acting"), or by clock-work, or at the will of persons directing the operations. In some cases lines attached to triggers are employed; in others electric currents are made use of. The American school for offensive *T.* is at Newport, R. I.

Torrefy, to roast ores or drugs; to dry by a fire.

Torsion-Balance, an instrument for estimating very minute forces.

Tortoises, shielded reptiles, species of *Testudo* and *Emys*. Some are edible, as the large *Testudo Indicus*, which is eaten both fresh and salted, and a beautifully clear oil is prepared from the fat. The *Emys trijuga* and the *E. punctata* are kept as scavengers in wells. The horny shield plates of some are occasionally applied to manufacturing purposes. See TURTLE.

Tortoise-Shell, the upper shelly covering of the sea-turtle, the *Chelonia imbricata* and *caretta*, consisting of a great number of plates or blades overlapping each other like the slates of a roof. These separate blades vary greatly in size, shape, thickness, and color, so that the most suitable application cannot be determined till each blade is examined separately. As a new layer of the substance is formed every year, the shell thickens as the animal grows older. The back shell is always better than the under or belly shell. As to which is preferred for particular purposes, — rich dark-brown, markings of golden-yellow, light-red, pale-yellow, etc., — this is matter of varying taste and fashion. Tortoise-shell is worked up into work-boxes, combs, tea-caddies, snuff-boxes, cabinets, spectacle-cases, and numerous other articles; also for veneering on fancy cabinet-work. The shells of turtles of the tropical seas are those which have the greatest commercial importance; and the best quality is said to be brought from the Spice Islands and New Guinea. Singapore is the principal market; the prices at that place vary according to quality from $700 to $1,500 per picul. An inferior kind is brought from the West Indies. *Imp.* duty: unmanufactured, free; manufactured, 35 per cent.

Manuf. — The remarkable properties of this substance render it amenable to many varieties of manufacturing treatment. (1.) *Welding*. Small pieces may be joined by a true welding process, by scraping and thinning the edges, overlapping, and pressing under the influence of heat. (2.) *Softening*. Boiling water softens it to some degree, and facilitates many modes of treating it. (3.) *Sawing*. When dry and cold, the tortoise-shell yields easily to the action of a fine saw. (4.) *Stretching*. When a slit is made, and the piece softened by heat, the slit can be so stretched out aud worked as to form the ring for an eye-glass or spectacle frame. (5.) *Moulding*. As the substance becomes softened by boiling water, it admits of being pressed into a multitude of forms, by the use of iron moulds, dies, and counterdies; by these means boxes and ornaments of various kinds are made. (6.) *Pressing*. There is another kind of moulding, much practised in France, whereby fragments of tortoise-shell, in the forms of cuttings, shavings, turnings, filings, dust, and the like, can be collected into a kind of stiff putty by the action of boiling water and pressed into moulds or dies. (7.) *Veneering*. Thin plates of tortoise-shell are often applied as a veneer to the surface of wood by gluing, the back of the veneer being painted in rich colors, to hide the grain of the wood and to heighten the tints of the shell. (8.) *Inlaying*. To inlay or incrust tortoise-shell with gold, silver, mother-of-pearl, etc., the latter is driven into the very substance of the former by the combined influence of softening and heavy pressure.

Touch-Paper, paper steeped in saltpetre, that ignites slowly and burns in sparks.

Touch-Stone, LYDIAN STONE, a compact black basalt, used as a test to determine readily the value of gold or silver by the touch.

Touch-Wood. See AGARIC.

Toughened Glass. See GLASS.

Toulon. See FRANCE.

Tourmaline, a name for the more perfect forms of schorl. It is chiefly composed of silica, alumina, boracic acid, etc., and has been divided by Rammelsberg into five sub-groups, viz.: 1, *Magnesia T.*; 2, *Iron-magnesia T.*; 3, *Iron* or *Black T.*; 4, *Iron manganese-lithia T.*; 5, *Lithia T.* The transparent colored varieties are sometimes cut into ring-stones, etc., and when reduced to thin slices, are much valued for making experiments on the polarization of light, and for analyzing the optical properties of other minerals. The Red *T.*, or *Rubellite*, possesses considerable beauty. The finest kinds of *T.* are brought from Brazil, Ceylon, Ava, and Siberia.

Tous-les-Mois, a name given to the starch obtained from the tubers of some species of South American *Canna*, *C. glauca*, and *C. edulis*.

Touters. See BARKERS.

Tow, the waste fibres or refuse after carding flax and hemp, which is made into bags, sheeting, and yarn, and used for various other purposes; some kinds are called codilla. *Imp.* duty, flax, hemp, or codilla, $10 per ton.

Towage, fees for towing.

Tow-Boat, a steam-tug used for towing other vessels; also the vessel which is towed, or drawn by a tow-line.

Towel, a cloth to dry the hands and face after washing; a cleaning cloth used by servants.

Towel-Gourds, the fruit of a trailing-plant, the *Luffa-Egyptiaca*, common throughout the tropics, used for sponges, drying rubbers, gun-wadding, the manufacture of baskets, hats, etc.

Towel-Horse, a wooden frame or stand for a dressing-room, to hang towels on.

Towelling, a coarse fabric made of flax, diaper, huckaback, etc.

Towel-Roller, a revolving wooden pin affixed to a door, for hanging a circular towel on.

Towing, the act of drawing or hauling a vessel forward in the water by means of a rope attached to another vessel, or, if on a canal, to a horse or horses.

Tow-Line, a rope or cable affixed to a barge on a river or canal, or to a ship drawn along by a steam-tug.

Tow-Yarn, a coarse kind of yarn spun from tow.

Toys [Fr. *jouets, bimbelots*; Ger. *Spielzeug, Spielsachen*; It. *trastulli*; Sp. *dijes, juguetes de ninnos*], children's playthings, baubles, and trifling articles of all sorts designed for amusement to children.

Imp. duty: All toys, except dolls, 50 per cent; dolls of all kinds, 35 per cent; dolls' wardrobes and toilet articles, as toys, 50 per cent.

France and Germany are the chief competitors in the toy market, the first for taste, and the second for cheapness. The peasants of Saxon Switzerland spend their winter evenings in cutting out the immense supply of farmyards and their appropriate animals, soldiers of every nation, and household implements of every kind. Beasts, covered with velvety coats, colored according to the animal, are made at Rodach; toys in porcelain at Ohrdruff; whilst the baby dolls, simply attired, come from Sonnenberg, Neustadt, and Wallerhausen. Men made in plaster are despatched to us from Prussia, whilst leaden soldiers, measuring about an inch in height, painted and heavily armed, come from Bavaria, Nuremberg, and Furth. Household utensils in china — such as pipkins, saucepans, cups and saucers, dolls' heads in china, games of lotto, penny watches, wooden wheelbarrows, spades and rakes — are made in several departments of France. The Quartier du Temple, in Paris, produces all other toys, and each workmau has his specialty. For instance, the man who makes rabbits striking on a drum with their fore-paws, makes no other toy. Of these there are annually 43,200 sold. There are six manufactories of brass trumpets in Paris alone. 200,000 are monthly made in that city. Their prime cost is 30 cts. per doz., and the supply never equals the demand. They are made of oak or beech. Of dolls the number is legion. One manufacturer alone supplies the children of this country with 50,000 per annum; and it would be impossible to detail the scores made of scraps of indefinite materials, put together by poor seamstresses living in garrets, to be sold by women still poorer, crouched beneath a *porte-cochère*, now frozen by the bitter blast, and a few months hence scorched by the blazing sun. These dolls for the humble are made by no rule, but the *bebes* for the rich employ several separate trades. There are workmen who stretch the flesh-tinted leather with which they are covered, and nail it on boards, that it may acquire the requisite suppleness; others cut the skin into the shape required to cover legs, arms, etc.; others line these detached pieces with calico; others, again, fill the

sewn skin with bran. A separate branch of the trade is that of adapting heads and arms to the bran-filled bodies. These heads, when in porcelain and paste, come from Germany, whereas waxen occiputs are moulded and tinted in Paris. Wig-making for dolls employs three separate trades, namely, makers of human hair wigs, of wigs manufactured from the Thibet goat, and those of lamb skin. Dolls' shoes have a trade to themselves.

American Manuf. and Trade. — The tin toys used in this country are now nearly all made in Meriden, Connecticut, where large quantities of tin household goods are also manufactured. Wooden toys, of the less fragile kind, are largely manufactured in several Connecticut towns, and in New York and Philadelphia. These consist of children's wheelbarrows, drums, rocking-horses, carriages, carts, blocks, rail-cars, hoops, sleds, etc. The patentees of the new sensation toys, as the dancing negro, the returning ball, and Quaker popgun, are said to have made fortunes. The railway train, and several other new toys, have also had great temporary success. Red india-rubber balloons are made in France, and filled here with gas. Pewter toys, comprising soldiers, landscapes, trees, etc., are now largely made in this country, though many are yet imported from Germany. The stuffed bodies of dolls are made in New York, Boston, and Philadelphia, as also the arms; but Germany still sends many. The arms of stuffed dolls are an especial article of commerce. They are not, like the legs, attached to the bodies, but are sold separately. The heads are likewise purchased, and are either of French porcelain and finely featured, of German china or papier-maché, of English wax, of American india-rubber, or of an imitation of papier-maché. This latter is of thin layers of muslin, coated with oil paint, which has the advantage of washing without injury, and is exceedingly strong, though by no means of fine finish. India-rubber hollow toys of every description, except balls, grotesque masks and birds, and men that squeak when squeezed, are among our own productions. Mechanical toys, such as imitation steam-engines, steamers, etc., are made here; as also kaleidoscopes. Clay marbles come exclusively from Saxony, and are prepared in moulds by machinery, from a clay not found in other countries. The material for agate marbles is obtained in the Hartz Mountains of Germany. A Japanese top has been lately in vogue, and several Chinese toys have been for years in use. Croquet instruments are made in Pawtucket and Providence, R. I., and in Boston and Springfield, Mass. Maple is the wood principally used, though lignum-vitæ is sometimes employed. For more expensive kinds boxwood is the material. Small balls, for parlor use during the winter months, are also made. The new game of martello employs the same woods. The parlor balls are of ivory.

Trace, a chain or harness strap by which horses draw. — To outline or copy; to mark out or draw. — To follow by the spoor or trail.

Traces, hide or rope harness bands.

Tracing-Paper, a kind of thin oiled paper for taking impressions. It may be made by dipping a sheet into a thick solution of gum arabic, and pressing between two dry sheets, thus rendering all three transparent.

Track-Way, a tram road; a foot-path.

Tract, a brief treatise; a small religious handbill or pamphlet.

Trade, the commerce of a country; commercial or mechanical employment; traffic. See COMMERCE.

Trade Dollar. See MONEY.

Trade-Mark, a symbol, emblem, or mark, which a tradesman puts upon, or wraps or attaches in some way to, the goods he manufactures or has caused to be manufactured. It may be in any form of letters, words, vignettes, or ornamental design. Newly recognized words may form a *T.-M.* A common name of an article and of a place may, by combination, become a *T.-M.* In Great Britain and in France the merchants and manufacturers are fully protected by law in the exclusive use of their *T.-M.;* and in this country the whole matter of *T.-M.* seemed to have been satisfactorily settled by act of Congress, July 3, 1870 (Sections 4,937 to 4,947 of the U. States Revised Statutes), whose provisions, as taken from the Patent Office Regulations, were as follows: —

"Any person or firm domiciled in the U. States, and any corporation created by the authority of the U. States, or of any State or Territory, and any person, firm, or corporation resident of or located in any foreign country, which, by treaty or convention, affords similar privileges to citizens of the U. States, and who are entitled to the exclusive use of any lawful *T.-M.*, or who intend to adopt and use any *T.-M.* for exclusive use within the U. States, may obtain protection for such lawful *T.-M.* by complying with the following requirements, to wit: 1. By causing to be recorded in the Patent Office the names of the parties, and their residences and place of business, who desire the protection of the *T.-M.* 2. The class of merchandise and the particular description of goods comprised in such class, by which the *T. M.* has been or is intended to be appropriated. 3. A description of the *T. M.* itself, with fac-similes thereof, and the mode in which it has been or is intended to be applied and used. 4. The length of time, if any, during which the *T.-M.* has been used. 5. The payment of a fee of $25, in the same manner and for the same purpose as the fee required for patents. 6. The compliance with such regulations as may be prescribed by the Commissioner of Patents. 7. The filing of a declaration, under the oath of the person (see forms, pages 863-64), or of some member of the firm or officer of the corporation, to the effect that the party claiming protection for the *T.-M.* has a right to the use of the same, and that no other person, firm, or corporation has a right to such use, either in the identical form or having such near resemblance thereto as might be calculated to deceive, and that the description and fac-similes presented for record are true copies of the *T.-M.* sought to be protected. The oath must also state the domicile and citizenship of the person desiring registration. The petition asking for registration should be accompanied with a distinct statement or specification, setting forth the domicile and residence of the applicant, the length of time the *T.-M.* has been used, the mode in which it is intended to apply it, and the particular description of goods comprised in the class by which it has been appropriated, and giving a full description of the design proposed, particularly distinguishing between the essential and the non-essential features thereof. — The protection for such *T.-M.* will remain in force for 30 years, and may, upon the payment of a second fee, be renewed for 30 years longer, except in cases where such *T.-M.* is claimed for, and applied to, articles not manufactured in this country, and in which it receives protection under the laws of any foreign country for a shorter period, in which case it shall cease to have force in this country, by virtue of the registration, at the same time that it becomes of no effect elsewhere. — No proposed *T.-M.* will be received or recorded which is not and cannot become a lawful *T.-M.*, or which is merely the name of a person, firm, or corporation only, unaccompanied by a mark sufficient to distinguish it from the same name when used by other persons, or which is identical with a *T.-M.* appropriate to the same class of merchandise and belonging to a different owner, and already registered or received for registration, or which so nearly resembles such last-mentioned *T.-M.* as to be likely to deceive the public; but any lawful *T.-M.* rightfully used at the time of the passage of the act relating to *T.-M.* (July 8, 1870) may be registered. All applications for registration are referred in the first instance to a *T.-M.* examiner. From adverse decision by such examiner upon the applicant's right to registration, an appeal directly to the Commissioner will lie, no fee being charged therefor. In case of conflicting applications for registration, the Office reserves the right to declare an interference, in order that the parties may have opportunity to prove priority of adoption or right; and the proceedings on such interference will follow, as nearly as practicable, the practice in interferences upon applications for patents. — Where the *T.-M.* can be represented by a fac-simile which conforms to the rules for drawings of mechanical patents, such a drawing may be furnished by applicant, and the additional copies will be produced by the photo-lithographic process at the expense of the Office. Or the applicant may furnish one fac-simile of the *T.-M.*, mounted on a card 10 by 15 inches in size, and 10 additional copies not mounted, as in designs; but in all cases the mounted fac-simile or the drawing must be signed by the applicant or his authorized attorney, and the signature must be attested by two witnesses. — The right to the use of any *T.-M.* is assignable by any instrument of writing, and such assignment must be recorded in the Patent Office within sixty days after its execution, in default of which it shall be void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice. The fees will be the same as are prescribed for recording assignments of patents." — By decision of Nov. 17, 1879, the *T.-M.* statute was declared void, for the reason that Congress had no constitutional authority to pass it. The opinion of the Supreme Court is here given in full, as delivered: "No. 705, The U. States, plaintiffs, vs. Emil Steffens; and No. 711, The U. States, plaintiffs, vs. Adolph Witteman, on certificates of division from the Circuit Court of the U. States for the S. district of New York; and No. 759, The U. States, plaintiffs, vs. W. W. Johnson, et al., on certificate of division from the Circuit Court of the U. States for the S. district of Ohio. These three cases are prosecutions for violations of what are known as the *T.-M.* laws embodied in Sections 4,937 to 4,947 of the Revised Statutes. The question upon which the judges of the lower courts were divided in opinion is, "Whether the acts of Congress on the subject of *T.-M.* are founded on any rightful authority in the Constitution of the U. States." It was maintained here by counsel who sought an affirmative answer to this question that there

are two clauses of the federal Constitution which furnish a sufficent warrant for the legislation in dispute. The first is the eighth clause of Section 8, Article I, which provides that Congress shall have power to pass laws "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." With regard to this point the court holds that the ordinary *T.-M.* has no necessary relation to invention or discovery. It is generally the outgrowth of a considerable period of use rather than of sudden invention, and is often the result of accident rather than design. The attempt to classify a *T.-M.* with the writings of authors is open to objections equally strong. The latter involve an element of originality, as do also inventions, while the *T.-M.* is generally nothing more than an adoption of something already in existence as the distinctive symbol of the person using it. It does not depend upon novelty, invention, discovery, or any work of the brain, but is founded simply upon priority of appropriation. The court is therefore of the opinion that while such legislation as that in question may be a judicious aid to the common law on the subject of *T.-M.* and may be within the competency of legislatures, whose general powers embrace that class of subjects, it is not authorized by the constitutional provision concerning authors and inventors and their writings and discoveries. The other clause of the Constitution relied on to support this legislation is the third of the same section, which provides that Congress shall have power "to regulate commerce with foreign nations and among the several States and with the Indian tribes." The argument is that the *T.-M.* is used to identify a particular class or quality of goods, and that as so used it is a valuable aid or instrument of commerce, and so comes within the scope of the constitutional provision cited. With regard to this point the court observes: First, That the clause quoted does not bring within the control of Congress every species of property which is the subject of commerce or which is used in commerce (Wallace vs. Louisiana, 8 How., 73; Paul vs. Virginia, 8 Wall., 168), and second, that the legislation now in question does not limit the use of *T.-M.* to interstate or international commerce, as it should do if it be based on the constitutional provision now quoted in its support. If it refers to all trade and to commerce between all points, it is obviously the exercise of power not conferred upon Congress. That this is the purpose of this legislation seems, in the opinion of the court, to be evident. It contemplates the establishment of a universal system of *T.-M.* registration for the benefit of all who have already used a *T.-M.* or who wish to adopt one in future, without regard to the character of the trade to which it is to be applied or to the locality of the owner. Such legislation is, in the opinion of this court, in excess of congressional power. It has been argued that if Congress has power to regulate *T.-M.* used in commerce with other nations and among the several States, its legislation, so far as it relates to that class of cases, should be held valid; but to this, the court holds, there are two objections. First, that there is nothing to show that the *T. M.* in the three causes now under consideration were used in that kind of commerce; and second, that it is not within the judicial province to give the words used by Congress a narrower meaning than they are manifestly intended to bear. To do so would be virtually to make a law which would be only partial in its operation, and which would complicate the rights which parties would hold in some instances under the act of Congress and in others under State laws. The court wishes, however, to be understood as leaving the whole question of the treaty-making power of the general government over *T.-M.*, and the duty of Congress to pass any laws necessary to carry such treaties into effect, untouched. The question in each of these cases — viz., whether these statutes can be upheld, in whole or in part, as valid and constitutional — must be answered in the negative, and it will be so certified to the Circuit Courts. Opinion by Justice Miller." Under the provisions of the federal *T.-M.* law thus pronounced unconstitutional, about 8,000 *T.-M.* had been registered at the Patent Office, and about 200 applications for registry were pending. The two only provisions in the Constitution cited as authority by Congress in passing the act of July 8, 1870, are the clauses which empower Congress, first, to pass laws "securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries;" and second, "to regulate commerce with foreign nations and among the several States." The court seems to have had no doubt that a *T.-M.* is neither a discovery, an invention, nor a writing, and hence that no authority for congressional legislation on the subject of *T.-M.* is found in the first clause just cited. The commerce clause of the Constitution authorizes legislation regulating international or interstate commerce, but not commerce confined within the boundaries of a State. The court found that the *T.-M.* legislation of Congress was not restricted to interstate or international commerce, but that it was equally applicable to all trade and to commerce between all points. This intrastate feature or operation of the law, as the court held, vitiated the legislation in question and gave to it a character which put it beyond the constitutional powers of Congress. Of course no federal statute so unrestricted in its operation as that which has been annulled can hereafter be made without an amendment to the Constitution. But the court openly disclaimed the expression of any opinion against the power of Congress to pass laws giving effect to treaties for the protection of foreign *T.-M.*, and it did not deny that a *T.-M.* statute applying only to international or interstate commerce might be constitutional. There is nothing, then, in this decision to prevent congressional legislation in the matter of foreign *T.-M.* But it practically renders impossible any federal statutory protection for domestic *T.-M.* For, admitting that there is no constitutional objection to a *T.-M.* law applicable exclusively to trade among the States, such a law, for obvious reasons, would be practically useless. The only statutory protection, then, that the merchants and manufacturers of the country can look forward to for what has been called their commercial signatures must be in the form of State legislation. Acts of this kind now exist in some of the States, and will doubtless be passed in others. But they cannot take the place of a federal *T.-M.* statute any more than State insolvent acts can serve the purpose of a national bankrupt law. But, independently of federal or State legislation, property in *T.-M.* is recognized and protected by the common law, which affords a remedy by injunction and action for damages in case of infringement. Long before any statute for this purpose was passed by Congress, the common law courts were open for redress to the owners of violated *T.-M.* In facts, four fifths of all the *T.-M.* litigation that has arisen in this country has come up not under the statute but at common law. It is true that the advantages secured by a national statute are much greater than those afforded by the common law. The remedies are more effective and complete in the former than in the latter case. One of the acts of Congress which has been annulled provided for criminal proceedings against a conterfeiter of *T.-M.*; only civil remedies are afforded by the common law. The federal statute secured the exclusive right to a *T.-M.* from the date of registration; the common law does not recognize property in a *T.-M.* until it has been used long enough to have acquired a value. While, then, the owners of valuable *T.-M.* will have no reason to fear, nor would-be infringers to hope, that the entire *T.-M.* system of the country has been abolished, it cannot be denied that the judgment of the Supreme Court will work a substantial loss to the commercial world. By the law of the State of New York it is expressly provided that every person who shall knowingly and wilfully forge or counterfeit any representation, likeness, similitude, copy, or imitation of the private stamp, wrapper, or label usually affixed by any manufacturer, on or in the sale of any goods, with intent to deceive or defraud the purchaser or manufacturer, shall be punished by imprisonment, etc. No property can be acquired in words, marks, or devices, which denote the mere nature, kind, and quality of articles. Mere variations of arrangement of a *T.-M.*, with secondary additions and omissions, will justify an injunction. While there may be striking differences in *T.-M.*, yet if in the last made there is an ingenuity which would deceive, the court will interfere. Where injury is not probable, an injunction will not be granted; nor will damages be given where no sales of goods covered by a forged *T.-M.* have taken place. A simulated article may be equal in value to that covered by the true mark, but still it be enjoined while it is covered by an imitation mark. Although intermediate buyers may know the difference between true and false, yet if retailers will be deceived, an injunction and damages may be had. Where goods, with a false mark, are made for a foreign market, an injunction will stop them. Injunctions have been granted where there have been parties of the same name, and the similarity of *T.-M.* carried the conclusion of simulation. A party runs a chance of affecting his right to a *T.-M.* by non-use, by forbearance in suing protectively, and by adopting a new one.

Trade-Price, a lower price allowed to members of the same trade, or by wholesale dealers to retailers.

Trader, in the legal sense of the term, is one who makes it his business to buy merchandise, or goods and chattels, and to sell the same for the purpose of making a profit. The *quantum* of dealing is immaterial, when an intention to deal generally exists. Questions as to who is a *T.* most frequently arise under the bankrupt laws; and the most difficult among them are those cases where the party follows a business which is not that of buying and selling principally, but, in which he is occasionally engaged in purchases and sales. A farmer, who bought a large quantity of potatoes, not to be used on his farm, but merely to sell again for a profit, was also declared to be a *T.* A butcher who kills only such cattle as he has reared himself is not a *T.*, but if he buy them and kill and sell them with a view to profit, he is a *T.*

Traders Insurance Co., a fire-insurance Co., located in Chicago, Ill., organized in 1872. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; net surplus, $131,416; risks in force, $18,577,486; premiums, $281,124. Premiums received since the organization of the Co., $2,635,-197; losses paid, $1,442,775; cash dividends paid to stockholders, $377,500.

Trade-Sale, a special auction or sale of articles suited to a particular class of dealers, as the semi-annual sale of books in New York, etc.

Tradesman, in England and America, a common name for a storekeeper, but in Scotland a handicraftsman; all who keep store being, according to the constitution of boroughs, called merchants.

Tradesmen's Fire-Insurance Co., located in New York City, organized in 1858. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; net surplus, $102,012; risks in force, $20,171,332; premiums, $165,442. Premiums received since the organization of the Co., $2,788,735; losses paid, $1,681,007; cash dividends paid to stockholders, $351,000.

Trades Union, an arrangement or combination entered into by the workmen of particular trades, or manufactures, in order to regulate the prices of labor, the hours during which labor is employed, and not unfrequently the number of workmen engaged by an employer, the number of apprentices bound to the employer or his foreman, and the number of journeymen.

Trades unions have acquired in England a much more perfect system of organization than anywhere else. In all the mechanic trades, and, indeed, in the various branches of the same trade, there is a union which binds its members together for good or evil, and that is so thoroughly organized, and its regulations so strictly adhered to, that, if more wisely managed, these societies might be the means of really ameliorating the condition of the laboring classes. But these are more often than otherwise governed by turbulent and unreasonable men, who do not know, or rather do not care to know, when sufficient concession has been obtained; for concession on the part of the employer is too frequently met with a demand for further concession, and this goes on until the climax is reached, when all work is stopped, because the cost of production resulting from too expensive labor will not justify the employer in continuing operations, and in consequence the men find themselves out of employment. A conciliatory spirit rarely ever prevails among the active and, consequently, the ruling members of the union; and, unfortunately, painful experience in not knowing when they were well enough to do, has taught them no lesson, or, if it has, they have not profited by it, since it has now become an everyday occurrence to hear of the misery that is overtaking men "on strike," or "locked out;" and if the need of food and clothing was only felt by the parties who are responsible for the loss of it, and not by women and children, there would generally be little cause for sympathy. However, it is difficult in this, as in other matters, to discriminate, and the wife and children of the coal miner or the mason must suffer because the bread-winner of the family demands larger wages than the employer can afford to pay. In these cases recourse is had to the accumulated funds of the union, and as long as this fund lasts the men receive an allowance, but not sufficient for them to live so comfortably as hitherto, and, the fund becoming soon exhausted, scenes of privation and misery commence, only to be mitigated by aid from charitable people, which is usually extended to the women and children; but, of course, it is not substantial or certain. Sometimes another union will extend aid, but in such a case the object is only to assist in prolonging the strike. We believe that in a majority of these cases the strike ends in the submission of the men, and when one considers how much money they have lost in wages alone, to say nothing of the loss of the whole of the funds of the union, one will regret that more wisdom has not been displayed on the part of the men, and that the money accumulated by the union had not been devoted to educational purposes, of which they stand much in need. In this connection a yet more serious cause serves to enhance the cost of production, and is one result of the arbitrary regulations of the trades unions. We refer to the system of virtually handicapping labor by a rule which does not allow a unionist to work with a *will*. However much skill he may possess, or however so willing he may be to work rapidly, he is forbidden to accomplish more than an average amount of work in the usual time, because it might derogate from the interest of his less skilful or less willing brother unionist. For instance, a clever and willing brick-mason is not permitted to lay more than the ordinary number of bricks per day for fear of jeopardizing his slower or less willing brother unionist's chance of obtaining work. The same regulation exists in all other trades where it is at all applicable. Thus the real amount of labor for a given time is lessened, as well as the wages become dearer by other means; and as a consequence of all this, expensive and uncertain labor paralyzes industry, diminishes the quantity of manufactures and the consequent exportation of the same; and to the extent of the loss of the profit on the decrease in the exportation of goods must the prime necessaries of life, such as meat and breadstuffs, become dearer; so that finally the laboring class, however ignorantly, is the prime cause of its own injury, and feels the pinch more severely than any other class. The number of members enrolled on the trades unions of Great Britain is estimated at 1,200,000. We borrow the following information on the American trades unions from the excellent article on that subject in *The American Cyclopædia*: "Though the workingmen in the U. States have enjoyed unrestricted liberty of combination, the trades unions of this country do not compare with those of the United Kingdom in membership, resources, or discipline. The following table comprises the principal unions with a national organization; all of these, except the miners' union, have branches in Canada:—

Names of Societies.	Date of organization.	No. of branches.	No. of members.
International typographical union...	1852	171	10,295
Machinists' and blacksmiths' international union..................	1859	....	8,000
Iron moulders' union of North America..............................	1859	150	7,500
Brotherhood of locomotive engineers	1863	188	12,000
Journeymen tailors' national trades union..........................	1865	40	2,800
Coopers' international union........	1870	....	5,000
Cigar makers' international union...	....	100	5,000
Miners' national union..............	1873	347	35,355
United sons of Vulcan...............	1874	....	4,000

"The miners' union comprises organizations which have existed for years in different States, of which the strongest was that of the anthracite miners of Pennsylvania. The membership of the national association is now distributed as follows: Pennsylvania, 20,840; Ohio, 4,734; Illinois, 5,122; Indiana, 2,135; Indian Territory, 57; Iowa, 272; Colorado, 242; Wyoming, 544; Maryland, 431; Missouri, 547; Kansas, 123; Tennessee, 129; West Virginia, 178. The society of the 'United Sons of Vulcan' comprises iron puddlers and iron boilers. The local unions are called 'forges.' In addition to the above there are the bricklayers' national union, the united order of American plasterers, the house painters, the hat finishers' association, the knights of St. Crispin (shoemakers), the order of morocco dressers, the journeymen horseshoers' union, the society of locomotive firemen, the mule spinners of the cotton factories, and the weavers, who in May, 1875, amalgamated their local unions into one association. There are also many local societies, some of which, especially among those in the larger cities, are of considerable importance. The financial panic of 1873 was followed by a large reduction in the membership of many of the unions. In New York City the aggregate membership in 1873 was 44,950; in 1874, 35,765. In 1871 the knights of St. Crispin had about 300 branches and 70,000 members; now they scarcely have a general organization, though many of the branches survive with a reduced membership. — In the national trades organizations of the U. States, legislative power is confided to an assembly of delegates, to which each local union sends a number bearing a stated relation to its membership, and the action of these bodies is generally final. The principal exceptions are in the tailors' union and the iron moulders' union, in both of which questions are decided by a majority of the unions, and not as in England by a majority of individual voters. The assemblies of delegates elect the executive officers usually for a term of one year. The qualifications for membership in the skilled trades usually include apprenticeship. In the typographical union the period required is four years. This union admits pressmen, and also charters local unions of pressmen. The iron moulders' union admits brass moulders on the same conditions as iron moulders, one of which conditions is the ability to earn the average rate of wages prevailing in the locality where the candidate is employed. The locomotive engineers require that the candidate shall be a white man, not less than 21 years of age, able to read and write, of temperate habits and good moral character, and possessing at least one year's experience as an engineer. The contributions in the American societies are generally small. Those of the tailors' union are but 10 cts. a month. Among the miners there is a strike fund, to which the contributions are 25 cts. a month. In several unions the initiation fees, and charges for new charters, travelling cards, etc., constitute the only sources of

income for general purposes. In the brotherhood of locomotive engineers, the iron moulders' union, and some others, the benefit features, so largely developed in the English societies, appear to a limited extent In most of the States the trades unions need legislation for the better security of their funds. The subject of a national law for this purpose, and also of legislation for the better protection of life in mining and other dangerous occupations, has been agitated. Nearly all of the societies above named declare themselves opposed to strikes except as a last resort, and several of them require their members to make an effort to settle disputes by arbitration, before applying to the society at large for authority to strike."

Trade-Winds, a name given to certain remarkable aerial currents, on account of their signal importance in commerce.

In those parts of the Atlantic and Pacific Oceans which are remote from the influence of the land, between the limits of about 28° or 30° N. and S. latitude, there is a constant E. wind. On the N. side of the equator it blows from between the N. and the E., and on the S. side from between the S. and the E., inclining more to the N. and S., according to the distance from the equator; these winds are denominated the N. E. and S. E. *trade-winds;* and are produced by a modification of the currents of cold air flowing from the poles to the equator, caused by the rotation of the earth on its axis. The direction and extent of the trade-winds vary with the season of the year; and in some parts of the world their course is entirely altered. The most remarkable of these modifications of the trade-winds are the Indian MONSOONS.

Trading-Post, a depot for merchandise in the North American Territories, established for bartering with the Indians.

Traffic-Return, a periodical statement of the receipts for goods and passengers on a railroad line.

Tragacanth. See GUM.

Train, something drawn along. — A collection of cars, etc., drawn by a locomotive forming a railroad train. — A line of artillery carriages and equipments. — The hanging part or finish of a lady's dress. — To exercise; to educate; to drill; to spread out fruit-trees or climbers in a particular manner.

Trainer, one who prepares men for athletic exercises, or horses for the race, etc.

Train-Oil, oil obtained from the blubber of the whale by boiling.

Tram, a doubled kind of silk, in which two or more thicknesses have been twisted together, used for the weft or cross threads of gros de Naples velvets, flowered silks, and the best varieties of silk goods.

Trammel, a joiner's instrument to draw ovals. — An iron hook to hang a kettle on.

Tramp, a foot traveller; a vagrant; also a workman who wanders from town to town in search of employment. — An instrument for trimming edges. — To cleanse clothes by treading on them in water.

Tram-Road, TRAMWAY, short lines of iron rails laid down usually to facilitate traction by horses.

Transcribe, to write out a copy.

Transcript, a written copy.

Transfer, a change of property, government funds, or joint-stock shares, etc., from one person to another. — A delivery or removal of warehoused goods. — To mark or impress on a lithographic stone.

Transfer-Book, a register of transfers of shares or stock.

Transfer-Paper, prepared paper used by lithographers; thin, unsized paper for taking copies of letters with a copying-press.

Transfer Printing, a name which, as distinguished from lithography and electro-printing, may be given to two or three special processes. In *anastatic printing*, invented by Baldermus in 1841, a copy is taken from a printed page of paper, without any type or any casting. The printed paper is moistened with dilute acid, and pressed by a roller on a clean zinc plate; the plate becomes *etched* by the acid in the parts not touched by the printed ink. Then, a mixture of gum and acid being applied, the etched parts become wetted with it, but the other parts not. Next, an inked roller being passed over the plate, the ink is repelled from the etched portion, but attracted by the printed portion; in other words, the old ink attracts the new ink. The plate, thus inked, is available for printing with the copper-plate press. In *chemitype*, a varnish, applied to a zinc plate, is etched, then bitten in with acid, and then removed, leaving the engraving etched into the plate. The lines are filled up with molten fusible metal, scraped down to a smooth level. The zinc is then eaten away to a certain depth by strong acid, and the fusible metal left in relief to print from. In *paneiconography*, the picture is either transferred to a zinc plate from a printed or a lithographed page, or is drawn on it by hand with lithographic ink. A roller with new ink is passed over the plate; the new ink adheres to the old, and is further thickened by a sprinkling of finely pounded resin. Acid is employed to eat away the zinc between the ink lines; and by this means a relief-block is produced, which can be printed from by the common press. It will easily be seen in what way these several processes differ from those noticed under *nature printing* in article PRINTING.

Transit-Circle. See TRANSIT-INSTRUMENT.

Transit-Duty, a government toll levied on the passage of goods through a State.

Transit-Instrument, an instrument for determining the place of the heavenly bodies, or the passage of a star across the meridian of any place on the sun's disk.

Translator, a linguist; one who explains or translates from one language into another.

Transparency, a picture painted on semi-transparent materials, such as very thin cloth, silver, or tissue-paper, etc., and illuminated by light placed at the back, so that it may be exhibited at night.

Transport, a ship for conveying stores or troops.

Transportation, the act of carrying or conveying goods from one place to another, by vessel, railroad cars, or otherwise. Foreign merchandise arriving at any port in the U. States may be transported inland to other countries, after having been duly entered, and bonds given for the delivery of the goods in some foreign country. The *transportation in bond* to be made strictly in accordance with the rules prescribed by the Treasury Department.

Transship, to transfer merchandise from a ship, vessel, car, or freight carriage of any kind, to some other vessel or carriage.

Transshipment, the act of transferring goods from one ship or conveyance to another.

Trap, a drain-pipe for gullies, sinks, or syphons, of different bore. — A sort of movable ladder or steps. — A gin or snare for vermin and wild animals. — A small wooden shoe for holding a ball to strike at. — A rock of felspar, hornblende, and augite.

Trap-Door, a lifting or sliding door in a loft, a roof, or on the stage of a theatre.

Trapo [Sp.], cloth of any kind; the sails of a ship.

Trapper, one who hunts wild animals for their skins or fur.

Trappings, the metallic ornaments embraced in saddlery goods.

Trash, a planting name in the West Indies for

the waste leaves and stalk of the sugar-cane after the juice has been expressed. — Bruised straw. — The loppings of trees. — Waste or rubbish.

Trash-House, the building on a sugar-plantation where the dry-pressed stalk of the sugar-cane is stored for fuel.

Trass, TARRASS, a name given to the calcareous tufa, — a volcanic earth, — when ground, for making hydraulic cement; a kind of artificial stone.

Traveller, an iron ring fitted so as to slide up and down a rope or mast.

Traveller (Commercial), an agent who visits towns to obtain orders for merchants and manufacturers, or to sell goods on commission. A town traveller is one who makes the circuit of a city or town, and does not make country journeys.

Travellers' Insurance Co., a life-insurance Co., located in Hartford, Conn., organized in 1866. *Statement*, Jan. 1, 1880: Assets, $3,704,262; liabilities, $2,942,830; policies in force, 11,352, amounting to $18.182,132; premiums, $434,603.66. Dividends paid to policy-holders, $174,491.70.

Travis, a wooden frame for confining unruly horses to be shod.

Trawl-Net, a sea drag-net for fishing.

Tray, a flat shallow board, trough, or stand, for holding, lifting, or carrying articles upon, of which there are many kinds, made of sheet iron, silver, and other metals, and of papier-mâché.

Treacle, a name in England for the uncrystallizable substances generated out of sugar by the application of heat in the process of refining.

Treadle, the part of a loom, turning-lathe, or grinding-wheel, worked by the foot.

Treasurer, an officer who has the charge of money belonging to a society or State.

Treasury, a State office or department for managing public finances. The U. States Treasury Department has the general management of all matters relating to customs and internal revenue, to commerce, and to navigation.

Treasury Notes, legal tender notes or bills of various denominations issued from the Treasury Department by special authority of the government. See MONEY.

Treaty, an agreement of commerce or navigation, entered into between two or more independent nations. The President of the U. States is empowered by the Constitution for making treaties with foreign governments, with the concurrent vote of two thirds of the Senate. The U. States has treaties, conventions, or reciprocal regulations of commerce and navigation with almost every foreign nation, which are in force, either in pursuance of the stipulations and terms expressed therein respectively, or by virtue of decrees, royal orders, or other local regulations on the part of foreign governments, on one side, and of proclamations by the President of the U. States on the other. The task of referring to any particular treaty, and of ascertaining the precise character of the commercial regulations of the U. States with any particular country, is far beyond the scope of this work.

Trebizond. See TURKEY.

Treenail, TRUNNEL, a wooden pin or plug, employed where metal bolts would be injurious, as in shipbuilding, for securing planks to the timbers.

Trefoil, a name for species of *Trifolium* or clover, many of which are highly important as food for cattle, either fresh or in the state of hay.

Trellis, a cross-barred frame of wood; lattice-work.

Trench, a ditch, drain, or pit.

Trencher, a wooden platter for bread, etc.

Trepanning Instrument, a cylindrical saw for removing pieces of the skull.

Trestle, TRESSEL, a beam or bar supported by divergent legs. *Trestle-work* of bridges consists of vertical posts, horizontal stringers, oblique braces, and cross-beams. *Trestle-trees* are supports for the top or platform of a mast, to which the stays and standing rigging at the upper masts are secured.

Trevat, a weaver's cutting instrument for severing the pile threads of velvet.

Triangle, a small steel triangular musical instrument of percussion, set in vibration by being struck with a short metal bar.

Triblet, a mandrel used in forging tools, nuts, rings, etc.

Tribometer, an instrument resembling a sled, used for estimating the friction of metals.

Tribunal of Commerce, a court of merchants, established in commercial cities of France, Belgium, Italy, etc., for settling mercantile disputes.

Tricolor, the French national standard, red, white, and blue.

Tricot, a kind of silk net or weaving, for purses or fancy articles.—A cotton knitted fabric for under-jackets.

Trident, a harpoon; a spar with three prongs.

Trieste. See AUSTRIA.

Trig, a wedge or block to prop up a cask, or to stop a wheel.

Trigger, the catch or movement by which some machinery is permitted to act.

Trim, to arrange, to ornament. — The condition of a vessel with regard to her cargo and ballast.

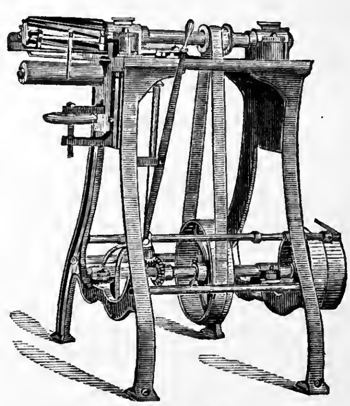

Fig. 476. — TRIMMING-SHEAR.

Trimmer, a piece of wood in a wall to support the ends of a joist or rafter. — One who fits, ornaments, or arranges.

Trimming-Can, a small tin vessel with a spout, for pouring oil into a table-lamp.

Trimmings, braids, tassels, gimps, fringes, silk buttons, and such like ornaments and appendages for ladies' dresses.

Trimming-Shear, a machine (Fig. 476) for trimming wool borders on coir, and other mats.

Tringle, a lath extended between the posts of a bedstead; a curtain-rod.

Trinidad, a British island of the West Indies, lying off the N. coast of the continent of S. America, between lat. 10° 3′ and 10° 50′ N., lon. 60° 55′ and 62° W. It is about 55 m. in length, by 40 in breadth; area 1,754 sq. m. Pop. 110,000. There is excellent anchorage between the island and the mainland, and there are several good harbors. *Port of Spain*, the chief town and port of

entry, has one of the finest harbors in the West Indies; pop. 22,000. The soil of the island is rich and productive, its most important products being sugar, cocoa, molasses, rum, coffee, cocoa-nuts, and pitch, in addition to various kinds of timber, and also the choicest of West Indian fruits. The total extent of land under cultivation is 91,645 acres, the total acreage of the island being 1,120,000. Coal is found in the district of Manzanilla. A remarkable phenomenon is the asphaltic lake near the village of La Brea, on the W. coast. A large trade in lumber and provisions is carried on with the U. States.

Trinket, a small ornament for the person; a toy or jewel. — The upper sail in a ship.

Trip, a flock of sheep or goats. — A journey. — To raise an anchor clear of the bottom.

Tripe, the stomach of a cow, etc., cleaned and cooked for food.

Tripod, a stand or support. — A three-legged stool or table.

Tripoli, the most easterly of the Barbary States, consists chiefly of a line of coast, extending about 650 m. along the Mediterranean, from Cape Razatin to Port Bomba, between lat. 28° and 33° 15′ N., lon. 10° and 20° E.; estimated area, 125,000 sq. m. Pop. 660,000. It is nominally a dependency of the Porte.

For a few miles inland, the country is of exuberant fertility, but beyond this the interior consists either of sandy deserts, or of the barren mountainous districts of Gavian and Mesalata. The coast tract produces in luxuriance many articles peculiar to the finest tropical climates, and corn is raised in abundance. The date forms the staple of the interior and sandy districts.

Tripoli, the capital and chief port, is situated on a neck of land projecting a short distance into the sea, in lat. 32° 53′ N., lon. 13° 11′ E. Pop. 25,000. *Exports:* wool, drugs, madder roots, barilla, hides, goat and sheep skins dressed, salt, trona, ostrich feathers, gold-dust, ivory, gum, dried fruits and dates, lotus-beans, cassol-venere, saffron, bullocks, sheep, and poultry. *Imports:* manufactured goods, colonials, timber, and naval stores. The principal intercourse is with the Levant, Malta, and Tunis.

Tripoli, rotten-stone; a grayish-yellow or red earth, chiefly composed of silex, used in polishing gold and silver; also made from clunch, or from septaria. *Imp.* free.

Trise, a nautical term, to haul up by means of a rope.

Trist, Tryst, a fair for the sale of cattle.

Triturate, to grind to powder or dust.

Trivet, an iron frame or stand to support a boiler on a grate, and keep it from pressing on the coals.

Trochometer, Trechometer, a measurer of the revolutions of a carriage wheel.

Trojero, a store-keeper in Spain.

Troll, to angle with a fishing-rod, which has the line on a running wheel or pulley.

Trombone, a large and powerful trumpet, composed of sliding-tubes, by which every sound in the diatonic and chromatic scales, within its compass, can be perfectly obtained.

Trompe [Fr.], a water-blowing engine; a blowing machine for furnaces.

Tron, a steelyard balance.

Trough, a long, deep tray; a spout.

Trousering, broadcloth, tartans, drills, and other materials for men's trousers.

Trousers, pantaloons, or men's garments for the legs and lower part of the person.

Trousseau [Fr.], a bride's general outfit; clothes or presents.

Trout, a small fresh-water fish, the *Salmo fario*, the flesh of which is of the finest quality.

Trow, a wooden air-spout in a mine. — A kind of boat.

Trowel, a small, flat, triangular metal moulder's tool, used by bricklayers and plasterers for spreading mortar, or for gardening.

Troy, a city of the State of New York, on the Hudson, at the head of steamboat navigation and tide-water, 6 m. N. of Albany, and 151 m. N. of New York; lat. 42° 44′ N., lon. 73° 40′ W. It is the principal outlet of the canals connecting the Hudson with Lakes Champlain, Ontario, and Erie; and it has railway connections with New York, Boston, and the N. and W. The Union Depot, in the centre of the city, is one of the largest in the country, 60 trains arriving and departing daily. The iron furnaces and factories are among the largest E. of the Alleghanies, being furnished with the magnetic ores of Lake Champlain, and the hematitic ores of Western Massachusetts. The coal is brought from Pennsylvania. The chief iron-works are those for bar-iron, railway-spikes, nails, locomotives, stoves, hot-air furnaces, hollow ware, machinery, agricultural implements, etc. Other important manufactures are those of railway cars, coaches, omnibuses, cotton and woollen goods, breweries, distilleries, flour, boots and shoes, shirts and collars, — the latter employing 4,500 persons, with extensive machinery. There is also the largest manufactory of mathematical instruments in the country. Pop. 52,000. *West Troy* stands on the opposite side of the Hudson, and has an extensive U. States arsenal. Pop. 12,000.

Troy and Boston R. R. runs from Troy, N. Y., to Vermont State line, 34.74 m.; leased lines, 18.15 m.; total length of lines operated, 52.89 m. This Co., located in Troy, was chartered in 1849, and the road opened in 1859. Cap. stock, $1,609,-010; funded debt, $2,179,500. Cost of constructing and equipment, $2,853,762.

Troy Weight, the American and British weight for the precious metals. The troy pound contains 12 ounces, or 5760 grains; 3 $\frac{1}{6}$ grs. make 1 carat of diamonds; 24 grs. 1 dwt.; 20 dwts. 1 oz.; 12 oz. 1 lb.; 25 lbs. 1 qr.; 100 lbs. 1 cwt. The moneyers have a peculiar subdivision of the troy grain, dividing the grain into 20 mites, the mite into 24 doits, the doit into 20 periots, and the periot into 24 blanks.

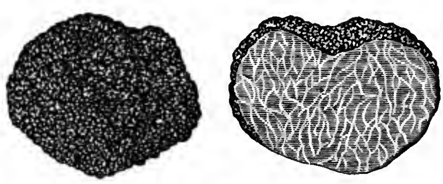

Fig. 477. — French Truffle.

Truck, barter or exchange dealing; paying wages in goods at overcharged prices. — A hand barrow; a two-wheeled carriage; the low solid wheel of a gun-carriage. — A circular cap or block of wood at the head of a flagstaff, or on the highest mast of a ship. — A low-sided railway vehicle.

Truckage. See Cartage.

Truckle, a small wheel or castor.

Truckle-Bed, a low, sliding bed, on rollers or castors.

Truckle-Cheese, a small, thick, solid cheese, that can be rolled on its edge.

Truckman, a carman; one who moves goods by hand in a truck.

Truffle, the *Tuber cibarium*, a sort of vegetable production, like a mushroom, formed under

ground. Being nutritious, fragrant, and stimulating in their properties, *T.* are highly esteemed as seasoning or flavoring agents. The best come from France and Italy, preserved in oil. The French are black and warty externally (Fig. 477), while the Piedmontese are smooth. A quart can of French *T.* sometimes sells as high as $5 or $6. *Imp.* duty (preserved), 35 per cent.

Trumpet, a metal wind instrument, used in bands, or for signalizing in war. — A tube for conveying sound, or for speaking through.

Trundle, to roll any thing along.

Trunk, the main stock of a tree. — A chest for clothes.

Trunk-Fish, the name given to several species of *Ostracion*, natives of the Indian and American seas, some of which are considered excellent fish for the table.

Trunk-Line, the main line of a railroad, separate from the branch lines or feeders.

Trunnions, the arms or side supports of a cannon, by which it rests upon the carriage.

Truss, a triangular frame of wood. — An abdominal support in cases of hernia, etc. — In seamanship, a rope confining a lower yard. — To bind or secure; to prepare poultry for cooking. — In England, a small hand-packed bundle of dry goods, not bound with iron hoops or cordage, in size a sq. yd. or less, and in weight not exceeding 3 cwt., the outer covering being frequently of canvas. If press-packed, it is denominated a bale; a truss of hay is 56 lbs. of old, and 60 lbs. of new; a truss of straw is 36 lbs.

Trust and Trustee. The term *trust* is commonly used to designate any equitable right or interest as distinguished from a legal one; properly, that class of equitable rights supposed to be founded in the confidence placed by one party in another, the name *trustee* denoting the person in whom confidence is placed, and the term *cestui que trust* signifying the person who trusts, — in other words, the party who enjoys a beneficial interest in the objects of which the trustee has the legal property. The courts consider a trust estate as equivalent to the legal ownership, governed by the same rules of property, and liable to every charge in equity which the other is subject to in law. Frequently, trusts involve the sale or purchase of lands or other property, the investment of funds, etc., in which cases the trustee has to exercise due caution, or he may be rendered liable for any loss that may arise. The duties of trustees are very various, and depend in great measure upon the nature of the particular trust.

Trustworthy, faithful; honest; worthy of being confided in.

Trying-Down, refining or boiling blubber or fat.

Trysail, a small gaff sail of strong canvas, set in bad weather.

Tsat-Lie, a species of China silk, obtained in Nankin and the N. parts of the empire, superior to the Canton kinds.

T-Square, a draughtsman's rule.

Tub, an open wooden vessel formed with staves, heading, and hoops, with two handles, so as to be carried by two persons, used for various domestic purposes, as for washing, for making cheese, etc.; a kind of short, one-headed cask, or small circular vat. — Hence, the amount which a tub contains, regarded as a measure of quantity. A tub of butter in New York contains about 50 lbs.

Tube, a long, narrow, hollow rod, pipe or siphon, made of tin, lead, zinc, iron, brass, or copper.

Manuf. — Many different methods are adopted for making tubes. Metal tubes are made sometimes by drawing a round bar of iron through a hole in a steel plate, nearly in the manner of wire-drawing, with a centre mandril to keep open the bore; sometimes by bending a strip into a cylindrical form, welding the edges, and finishing by drawing. But the best gun-barrels are now made by coiling a long strip of metal round a mandril, and finishing it into a tube by welding, hammering, and other processes. Gas-pipes and boiler-tubes are mostly made either by the first or the second method. Brass tubes for telescopes are bent round, soldered, and drawn. Ornamental tubes for pencil cases and other small articles are made by drawing through holes, which give the pattern as well as the form. Lead pipes are noticed under LEAD. Tin tubes for collapsible color receptacles are made by drawing out a short thick tube into a long thin one. For plan of making tubes by casting metals when in a molten state, see CASTING and CYLINDER.

Tube-Cleaner, a device for cleaning the interior of boiler and other tubes.

Tuberose, the *Polianthes tuberosa*, a plant of the amaryllis family, cultivated for its fragrant flowers. It yields a pleasant essential oil.

Tubing, materials for pipes. See TUBE.

Tubular-Bridge, a bridge consisting of a hollow trunk or tube, as the Britannia bridge across the Menai Strait, which unites the island of Anglesea with the mainland of Wales, England.

Tubular Steam-Boiler, a steam-boiler in which the water circulates in pipes, vertical, horizontal, or inclined, the fire encircling them.

Tuck, a horizontal plait or fold in a female's gown or petticoat.

Tucker, a piece of lace or net worn by females on the bosom or round the neck of a low dress.

Tucum, the name given in Brazil to the fibre of the *Astrocaryum vulgare*, from which are manufactured cordage, fishing-nets, hats, fans, beautifully fine hammocks, and other articles, where fineness, combined with strength, is required.

Tuf, a fat loam, and unctuous marl.

Tug, a tow-boat. — A four-wheeled timber frame. — A hoop of iron to hold a tackle. — To draw along.

Tulip, a beautiful liliaceous flower. In the middle of the 17th century there was quite a mania for cultivating *T.* in the Netherlands, and even at the present time Holland supplies Europe and America with bulbs.

Tulip-Tree, the *Liriodendron tulipifera*, one of the most remarkable of our North American forest trees. The wood is of a light color, with a greater sp. gr. than white pine, and is found in most of the States and Territories. The qualities are a moderate resistance to decay, and easy manipulation. The principal defect is the liability to shrink and warp. The wood is in common use, on account of its abundance and cheapness, for the manufacture of common furniture, shingles, and dry lumber.

Tulle, a thin silk lace, woven with very open meshes, and in narrow strips like ribbon.

Tumbler, a kind of latch in a lock, which, by means of a spring, detains the shot-bolt in its place, until a key lifts it, and leaves the bolt at liberty. — A drinking-glass without a foot.

Tumbrel, a dung-cart. — A wicker crib for holding hay.

Tun, a large cask, of an undefined and variable measurement, but in wine-measure assumed to contain 252 gallons, 2 butts of 126 gallons, or 4 hhds. of 63 gallons; a Finnish dry measure of 4 English bushels; a grain measure of Sweden, containing 2 spann: 18 tuns = 10 quarters. Some reckon 176½ tuns or barrels = 100 quarters. The tun of whale oil (252 galls.) weighs 17 cwt. 29 lbs. 12 oz. 14 drs.

Tunbridge-Ware, inlaid or mosaic work in

wood, which obtains its name from the place of manufacture, Tunbridge Wells, in Kent, England. They consist of fancy articles, work-boxes, caddies, desks, reels, etc.

Tuner, one who tunes a piano-forte.

Tung-Oil, a valuable oil expressed in China from the seeds of *Elæococca oleifera*, which is much used for painting boats, furniture, etc.

Tunic, a short frock coat; a young boy's dress.

Tuning-Fork, a steel instrument (Fig. 478) consisting of a handle and two prongs, which, when struck against the table, or some hard substance, produces a certain fixed note, by which the pitch of voices or instruments is determined. There are forks of various tones, but the A and C forks are most commonly used.

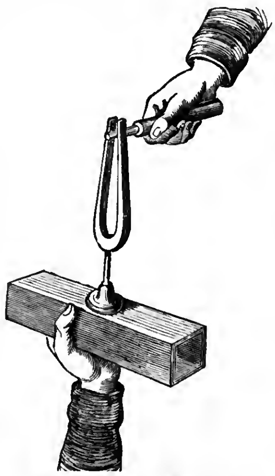

Fig. 478. — Tuning-Fork (French Diapason).

Tunis, a kingdom or regency of N. Africa, is a nominal dependency of the Turkish Empire, but the Bey of *T.* is virtually the sovereign of the country, and the authority with whom the European States directly treat in their commercial relations with *T.* It is principally between lat. 33° and 37° N., lon. 9° and 11° E.; having S. E. the regency of Tripoli; N. W., Algeria; S. and W. the Desert of Sahara; and N. and E. the Mediterranean; the area is roughly estimated at 72,000 sq. m. On the E. coast are those deep indentations known as the Gulf of Cabes, or Little Syrtis, and the Gulf of Hammamet; and on the N. the Gulf of *T.* and Bizerta. Pop. variously estimated at from 1,500,-000 to 2,500,000.

The N. portion of the country is mountainous and hilly, but all the S. part is a plain or level, and still (as in the time of the Romans, when it formed one of their granaries) extremely fertile. The principal river is the Majerdah, which, after a course of 140 m., falls into the Gulf of *T.* The minerals are silver, copper, lead, quicksilver, and salt. The vegetable products are wheat, maize, barley, millet, olives, dates, grapes, tobacco, hemp, indigo, cotton, senna, and opium. Buffaloes, sheep, camels, horses, and oxen constitute the chief domestic animals; while the lion, panther, ounce, lynx, wild boar, wolf, and bison comprise the principal wild ones, or the carnivora. The commerce of *T.* is larger than that of all the other Barbary States, the exports and manufactures consisting of soap, morocco leather, shawls, red skull-caps, or the fez; these with wheat, wax, olives, dates, hides, and feathers, comprise the most important items of export and trade. The foreign trade is mostly with France and Italy. There is very little direct commercial intercourse with the U. States.

Money. — Accounts are kept in piastres of 16 carobas or 52 aspers. The piastre is worth about 25 cents. The asper is an imaginary money. The value of foreign coins depends on the state of the exchange.

Weights and Measures. — Gold, silver, and pearls are weighed by the ounce of 8 meticals; 16 of these ounces make the Tunis pound = 7,773.5 Eng. grs. The principal commercial weight is the cantaro, containing 100 lbs., or rottoli, being equivalent to 111.05 lb. avoirdupois, or 50.36 kilogrammes. — The principal corn measure is the cafiz, divided into 16 whibas; and the whiba into 12 sahas. One cafiz = 14½ imperial bushels. — The pic, or principal long measure, is of 3 sorts; viz., the pic woollen measure = 26.5 Eng. inches; the pic silk measure = 24.8 do.; and the pic linen measure = 18.6 do.

Tunis, the capital and principal seaport of the State, is situated in lat. 36° 46′ N., lon. 10° 9′ E., 400 m. E. of Algiers. The bay of *T.* is somewhat in the form of a horseshoe. Its W. extremity, Cape Carthage, is situated about 4 m. N. E. from the Goletta; and its E. extremity, Cape Zafran, bears from Cape Carthage E. by S., distant about 13 m. The bay is about 16 m. deep, and has good anchorage all over, in from 10 to 4 fathoms water. It is exposed to the N. and N. E. gales; but they seldom occasion any damage. *T.* lies on the W. side of the bay, being separated from it by a large lagoon, having, where deepest, about 7 ft. water. The port is at the Goletta, or channel, passing through the narrow belt of land separating the lagoon from the sea; the entrance to it is by a canal, in which there is at all times 15 ft. water; and ships may use it on paying a fee of $3 a day. It is not, however, much resorted to; all vessels of considerable burden loading and unloading from their moorings in the bay, by means of lighters. The pop. of *T.* has been variously estimated at from 100,000 to 150,000.

Tunnel, a tubular opening, or an arched subterranean passage cut through a hill, a mountain, a rock, an eminence, or under a river or town, to carry a canal, road, railway, etc., in an advantageous and straight course.

Tunnel-Shaft, a pit or shaft sunk to give air to workmen or light to a tunnel, or to facilitate the raising of earth and stones to the surface.

Tunny [Fr. *thon*], a large fish of the mackerel family. The European *T.*, *Thynnus vulgaris*, is the object of important fisheries in the Mediterranean; its firm flesh is considered delicious. The American *T.*, *Thynnus secundo-dorsalis*, which attains a length of 9 to 12 ft., is found from New York to Nova Scotia. Its flesh, which is rarely used as food, resembles lean pork, with a fine mackerel taste. It gets very fat in August, and is then valuable for the oil, which is obtained by boiling the head and the abdomen, a single fish yielding about 20 gallons.

Turban, a linen or shawl wrapper worn round the head by males in Eastern countries. — A lady's old-fashioned head-dress.

Turbine. The turbine may be regarded as a kind of water-wheel laid on its side. Water enters the wheel down the hollow axis, and escapes at the circumference. In its passage it acts upon certain blades or radii, and thereby causes the wheel itself to rotate. The blades are curved in such a way as to assist the action. In some forms of turbine the water ascends the axis from below; but in this, as in the other case, it cannot escape at the circumference without setting the wheel in rotation. In a third arrangement the water descends through four tubes outside the wheel, enters between the curved arms, sets the wheel in motion, and then finds an exit through the axis. Many other arrangements of detail are adopted; but in all of them the flow of water causes a horizontal wheel to rotate; and this rotation is applied as a working power for machinery.

Turbot, a marine, soft-rayed fish of the flat-fish family, of which there are several species. The European *T.*, *Rhombus maximus*, is the finest of the family, and also the best and largest of all European flat-fishes, sometimes measuring 6 ft. in width, and weighing over 200 lbs. Its flesh has been highly esteemed from remote antiquity. The American or spotted *T.*, *Rhombus maculatus*, also called the New York plaice and watery flounder, is a delicate article of food. It is from 12 to 18 in. long, and 6 to 8 in. wide, sometimes weighing 20 lbs. It is caught along our E. coast, from Maryland to Maine.

Tureen, an earthenware or metal deep vessel for holding soup at a dinner-table.

Turf, a race-course. — The green surface or sward of grass lands; a name given to peat when cut and dried for fuel. Several chemical and economical products are now obtained from turf.

Turkey, a large domesticated fowl, the *Meleagris gallipavo*, which is bred in large numbers in all parts of the U. States for the use of the table. About 135,000 are annually sold in the New York market.

Turkey, or the OTTOMAN EMPIRE [Turk. *Osmanli Vilayeti*], a vast and once powerful empire, embracing, directly or as nominal supremacy, some of the best parts of S. E. Europe, W. Asia, and N. Africa. The fundamental laws of the empire are based on the precepts of the Koran. The will of the Sultan is absolute, in so far as it is not in opposition to the accepted truths of the Mahometan religion, as laid down in the sacred book of the Prophet. The legislative and executive authority is exercised, under the supreme direction of the Sultan, by two high dignitaries, the Sadrazam or Grand Vizier, the head of the temporal government, and the Sheïk-ub-Islam, the head of the church. The whole of the empire is divided into vilayets, or governments, and subdivided into sandjaks, or provinces, and kazas, or districts. A Vali, or general governor, who is held to represent the Sultan, and is assisted by a council, is placed at the head of each government. The provinces and districts are subjected to inferior authorities, under the superintendence of the principal governor. All subjects, however humble their origin, are eligible to, and may fill, the highest offices in the State. Birth confers no privilege, as all true believers are equal in the eye of the law. The area and pop. of the Ottoman Empire are known only by estimates. Previous to the Russian war of 1877-78, the total area of the empire was officially estimated at 1,742,874 sq. m., on which lived 28,165,000 inhabitants. The results of the war, sanctioned by the great European Powers and embodied in the stipulations of the Treaty of Berlin, signed July 13, 1878, greatly reduced the area and pop. of the empire, more particularly that of its most important part, in Europe. By the treaty, which created the semi-independent States of Bulgaria and of Eastern Roumelia, gave Bosnia and the Herzegovina to Austria-Hungary, and additions of territory to Roumania, Servia, and Montenegro, the total estimated area of the empire was reduced to 1,116,848 sq. m., and the pop. to 21 millions.

The total area and pop. of Turkey in Europe were estimated as follows before and after the Treaty of Berlin: —

	Area sq. m.	Population.
Turkey in Europe before the treaty	138,264	8,315,000
Cessions made under the treaty: —		
Bulgaria	24,360	1,859,000
Eastern Roumelia.....................	13,500	751,000
Bosnia and Herzegovina...............	28,125	1,061,000
Roumania, Servia, etc................	10,251	369,000
Total cessions...............	76,236	4,040,000
Actual Turkey in Europe.............	62,028	4,275,000

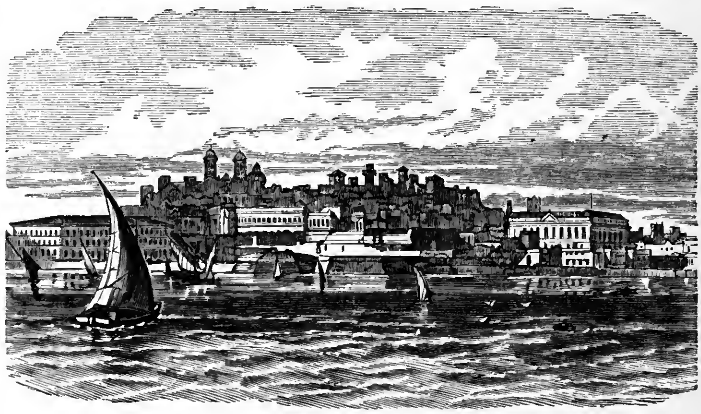

Fig. 479. — NEW PALACE (CONSTANTINOPLE).

The total area and pop. of the Turkish Empire in each of the three geographical divisions, including the nominal dependencies of Egypt and Tunis, were estimated as follows in 1879: —

Divisions.	Area. Engl. sq. m.	Total population.
Turkey in Europe................	62,028	4,275,000
Turkey in Asia	710,320	15,715,000
Turkey in Africa.................	344,500	1,010,000
Total............	1,116,848	21,000,000

Turkey in Europe is divided administratively into four vilayets, or provinces, but which do not include the district of Constantinople, which forms a separate government. The division of Turkey in Asia was into 14 villayets previous to the war of 1877-78; but two of these had to be ceded to Russia. By Art. 58 of the Treaty of Berlin, it was stipulated that there should be annexed to Russia the former Turkish possessions in Asia, comprising "the territories of Ardahan, Kars, and Batoum, with the port of Batoum, as well as all the territories comprised between the former Russo-Turkish frontier and a line beginning at the Black Sea, and extending to a point to the N. W. of Khorda and to the S. of Artvin." The provinces thus ceded to Russia are estimated to embrace an area of 5,670 sq. m., with a pop. of 600,644. A great part of the surface of *T. in Europe* is covered with mountains of moderate elevation; the Carpathians form a portion of the N. boundary. Rivers are numerous, the principal of which are the Danube and its tributaries; this river is placed under the administration of an International Commission, representing seven European Powers, who have complete control of the navigation and the execution of public improvements. The soil is for the most part fertile, but, owing to various causes, little progress has been made in agriculture. The cultivated products are maize, rice, cotton, rye, barley, millet; the natural products are the pine, beech, oak, lime, and ash, with the apple, pear, cherry, and apricot, in the basin of the Danube; the palm, maple, sycamore, walnut, chestnut, carob, box, myrtle, laurel, etc., S. of the Balkan; large forests of pine and fir in the N. W.; the olive, orange, citron, vine, peach, plum, and fruit trees in Albania; and abundance of roses in the valley of the Maritza. The mineral products are iron in abundance, lead blended with silver, copper, sulphur, salt, alum, but no coal. Its manufactures are almost entirely domestic, such as woollen and cotton stuffs, shawls, leather, fire-arms, with dyeing and printing works. — *T. in Asia*, the larger of the two divisions, comprises Asia Minor, Syria, including Palestine, the greater part of Armenia and Kurdistan, Mesopotamia (the valley of the Euphrates and Tigris), and the W. portion of Arabia bordering the Red Sea, with the district of El Hasa on the E. side of the Persian Gulf. By a treaty, signed June 4, 1878, between the British government and that of the Ottoman Empire, entitled "Convention of defensive alliance between Great Britain and Turkey," it was settled that Asiatic Turkey should be placed under British protection, to be defended, if necessary, "by force of arms" against any invader, and that "in return, the Sultan promises to England to introduce necessary reforms, to be agreed upon later between the two Powers, into the government, and for the protection of the Christian and other subjects of the Porte in these territories; and in order to enable England to make

necessary provision for executing her engagement, the Sultan further consents to assign the Island of Cyprus to be occupied and administered by England."

The financial affairs of the Ottoman Empire are in a state of thorough disorganization. Previous to the Russian invasion of 1877, there existed a virtual state of bankruptcy, which became almost irremediable through the enormous expenses of the war, followed by the separation of some of the richest provinces of European Turkey from the empire, with consequent diminution of the public revenue. — There are no official returns regarding the foreign commerce of the Turkish Empire. The average annual value of the imports of Turkey in Europe was estimated, previous to the Russian war and the Treaty of Berlin, at $95,000,000, and of the exports at $50,000,000. At present, the total value of the foreign commerce is probably reduced by one third, if not more. The commercial intercourse of the empire is mainly with Great Britain, Italy, Austria, and Greece. The direct commerce with the U. States is of relatively small importance, as shown in the following table of the U. States imports and exports to and from Turkey in Europe, Asia, and Africa (including Egypt and Tunis), for the fourteen years of 1866 to 1879: —

Years.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
	$	$	$	$
1866	565,548	5,297	341,764	912,609
1867	486,360	11,289	374,182	871,831
1868	719,553	26,544	676,248	1,422,345
1869	653,195	101,890	890,829	1,645,914
1870	2,565,289	13,025	678,718	3,257,032
1871	1,249,071	1,314	527,493	1,777,878
1872	1,209,443	6,995	866,719	2,083,157
1873	1,542,062	10,983	1,134,018	2,687,063
1874	2,549,493	9,058	786,877	3,345,428
1875	4,244,884	34	579,947	4,824,865
1876	3,388,371	2,258	439,647	3,830,276
1877	9,338,501	....	429,017	9,767,518
1878	1,413,061	100	558,091	1,971,252
1879	4,718,770	532	656,646	5,375,948

For the year 1879 the value of the principal articles imported from and exported to the U. States was as follows: *Imports*, wheat, $33,500; machinery, $25,000; fire-arms, $1,474,000; manuf. of steel, $184,000; petroleum, $1,352,865; cotton-seed, $10,048; shot and shell, $1,057,000. *Exports*, drugs, dyes, etc., $354,012; rags, $106,999; seeds, $16,917; olive-oil, $17,205; wool (*T.* in Asia), $100,508. The mercantile navy of the Turkish Empire is comparatively small. In 1879 its total tonnage was estimated at 181,500 tons, but this included coasting and other vessels. The shipping "de long cours" was reported at the same date to embrace 220 sailing vessels, of a total burden of 34,500 tons, and 11 steamers, of a burden of 3,350 tons. — The total length of railroads open for traffic in 1877, was 1,137 m., of which 965 m. were in Europe, and 172 m. in Asia. Through the cessions of territory ordered by the Treaty of Berlin, the length of the railroads in Europe was reduced to 786 m., and the total length in the empire to 958 m. — The length of telegraph lines on the 1st of January, 1877, was 17,950 m., and the length of wires, 31,782 m. The total number of despatches carried in the year 1879 was 1,210,756, of which 488,520 were official despatches, 491,898 internal, and 230,338 international messages. The number of telegraph offices was 401 in 1879. — An international postal service was established by the government in September, 1876, up to which time the post-office of Turkey was almost entirely managed by foreigners. There are no returns respecting the work of the post-office, though it is known that the number of letters, newspapers, etc., forwarded is very small in comparison with other countries. There were only 430 post-offices throughout the whole empire on the 1st of January, 1879. The principal of these offices, at Constantinople, belonged to Austria-Hungary, Egypt, France, Germany, Great Britain, Greece, and Russia. *Money, weights and measures*, and the American equivalents are: —

MONEY.

The Turkish Lira, or gold Medjidié.......	=	$4.300
Piastre, the gold official, 100 to the Lira..	=	0.043
" " becklik, 105 to the Lira......	=	0.040
" " copper, 110 to the Lira......	=	0.039

Large accounts are frequently, as in the official budget estimates, set down in *purses* of 500 Medjidié piastres, or 5 Turkish liras. The purse is generally calculated as worth $21.50. There exists a large amount of debased silver currency, to which were added, during the years 1876 to 1878, vast quantities of paper money, the effect being to raise gold to a high discount, and driving coin of standard weight entirely out of circulation. The present monetary system of Turkey was established in the reign of the late Sultan Abdul-Medjid, on which account the name of Medjidié is frequently given to the *Lira*, the unit of the system.

WEIGHTS AND MEASURES.

The *Oke*, *of* 400 *drams*........	=	2.8326 lbs. avoirdupois.
" *Almud*....................	=	1.151 gallon.
" *Killow*...................	=	0.9120 bushel.
44 *Okes* = 1 *Cantar* or *Kintal*	=	125 lb. avoirdupois.
39.44 *Okes* = ...	=	1 cwt.
180 *Okes* = 1 *Tcheké*.........	=	511.380 pounds.
1 *Kilo* = 20 *Okes*..........	=	0.36 quarter.
816 *Kilos*..................	=	100 quarters.
The *Andazé* (cloth measure)....	=	27 inches.
" *Archin* (land measure).....	=	30 inches.
" *Donum* (land measure)....	=	40 square paces.

The *killow* is the chief measure for grain, the lower measures being definite weights rather than measures. 100 killows are equal to 12.128 quarters, or 35.266 hectolitres. The principal Turkish seaports are the following: —

Beyrout, the most important seaport town of Syria, on the Mediterranean, 57 m. W. N. W. of Damascus. It is situated on rising ground on the N. side of the promontory of the Jebel-er-Roshch, which forms the spacious bay of St. George's. The roadstead to the N. E. of the town is sheltered from the S. W. wind, but is exposed to the W. and the N. W. The ancient harbor is now choked up. In 1874 the authorities determined to construct a small harbor, and $50,000 was allotted for the purpose. Beyrout is the seat of various consular establishments, and possesses a quarantine, a custom-house, and post-office. It exports silk, wool, bitumen, rags, and skins, and imports European goods for a large part of Syria. A light-house, 98 ft. high, is erected on the neighboring cape of Reas Beyrout. Pop. 70,000.

Constantinople [Turk. *Stamboul*], a famous city, formerly the metropolis of the Eastern, as it still is of the Turkish Empire, on a triangular point of land, on the European side of the Sea of Marmora (Propontis), at the point where it unites with the Bosporus, or channel leading to the Black Sea, lat. 41° 0′ 12″ N., lon. 28° 59′ 2″ E. The situation of this renowned city is, in a commercial point of view, one of the finest imaginable. Standing on the narrow straits uniting the Mediterranean and Euxine Seas, she at once commands, and is the entrepôt for, the commerce between them. The harbor is most excellent. It consists of an extensive inlet, or arm of the sea, stretching along the N.E. side of the city, which it divides from the suburbs of Galata and Pera. It has sufficient depth of water to float the largest ships, and can accommodate more than 1,000 sail. The strong current that sets through the Bosporus into the Sea of Marmora strikes against Seraglio Point, a part of the water, being in consequence forced into the harbor, runs along its S.W. side, till, arriving at its extremity, it escapes by the opposite side. In the middle the water is still. On leaving the port, it is necessary to keep well over to the N. side; for otherwise the ship might be taken by the current, and driven on Seraglio Point. It may be worth while, however, to remark, that notwithstanding this inconvenience, the current has been of signal service to the city by scouring the harbor, and carrying away the filth and ballast by which it must otherwise have been long since choked up. The distance across from Seraglio Point to the opposite suburb of Scutari, on the Asiatic coast, is rather more than 1 m. Within less than ¼ m. of the latter is a rocky islet upon which is a tower and light-house, known by the name of the Tower of Leander. Foreigners reside in Galata, Pera, and the suburbs on the E. side of the harbor; and it is there, consequently, that the principal trade of the place is carried on. The quays are good, and ships lie close alongside. The Bosporus, or channel of Constantinople, runs in a N. E. by N. direction about 15 m., varying in breadth from 1¼ to ½ m. It is swept by a rapid current, which it requires a brisk gale to stem, and has throughout a great depth of water. The Hellespont, or strait of the Dardanelles, leading from the Archipelago to the Sea of Marmora, is about 13 leagues in length. Its direction is nearly N. E. Where narrowest, it is little more than 1 m. across. It also is swept by a strong current, and has deep water throughout. Nothing can be more imposing than the appearance of the city when seen from the sea, but on landing the illusion vanishes. The streets are narrow, dark, ill-paved, and irregular. Owing to the want of any effective system of police, and of the most ordinary attention to cleanliness, they are extremely filthy. The houses are mostly built of wood, and fires are frequent. Most of these happen designedly; the burning of a few hundred houses being deemed the readiest and most effectual means of making the government aware of the public dissatisfaction, and of procuring a redress of grievances. Owing to the vicious institutions of the Turks, and the disorganized state of the empire, the trade of Constantinople is very far from being so extensive as might be supposed from its situation and population. The imports consist of corn, iron, timber, tallow, and furs, principally from the Black Sea; and of cotton stuffs and yarn, coal, tin, tin plates, woollens, silks, cutlery, watches and jewelry, paper, glass, furniture, indigo, cochineal, etc., from England and other European countries. Corn and coffee are imported from Alexandria; but considerable quantities of Brazil and West India coffee are also imported, particularly in British bottoms. Sugar is partly imported from the East, but principally from the West Indies. The exports consist of silk, which is by far the most important article, carpets, hides, wool, Angola goats'

hair, yellow-berries, boxwood, opium, galls, bullion, and diamonds, and a few other articles. But the exports are always very much less than the imports ; and ships carrying goods to Constantinople either return in ballast, or get return cargoes at Smyrna, Odessa, Salonica, etc., on which places they frequently procure bills at Constantinople. By far the largest proportion of the trade of the city, and of the Levant generally, is in the hands of Greek merchants, who by their superior skill, industry, and knowledge of those with whom they have to deal, have completely distanced their English, French, and other European competitors (denominated Franks). The Armenians only have been able to withstand the competition of the Greeks. Bargains are negotiated by Jew brokers, some of whom are rich. The climate of Constantinople is generally healthy, but the temperature is subject to great and sudden changes. Pop. 700,000.

Gallipoli, a town of the vilayet of Edirneh, 120 m. W.S. W. of Constantinople, on a peninsula at the N.E. extremity of the Dardanelles. It has two harbors, and was formerly of great importance as a centre of commerce and as the key of the Dardanelles. Its commerce is still considerable in grain, wine, silk, and oil, chiefly in the hands of the Greeks. Pop. 50,000.

Salonica, a town and seaport in the vilayet of its own name, at the head of the gulf of Salonica, 305 m. W. by S. of Constantinople. Within a few years the trade has considerably fallen off. Pop. 70,000.

Smyrna, a large city, and seaport on the W. side of Asia Minor, lat. 33° 25′ 36″ N., lon. 27° 6′ 45″ E. Smyrna is situated at the bottom of a deep gulf, the entrance to which lies between Mytilene on the N., and Cape Carabourun, in lat. 38° 41′ 30″ N., lon. 26° 21′ E., on the S. In addition to the light placed on Sanjak Kalessi in 1848, there were 3 other lights placed in the gulf in 1863, viz., a light-house on Cape Merminji, lat. 38° 37′ N., lon. 26° 46′ 20″ E., and two light-vessels, one off Tani Kedesse, and the other on Sanjak Spit. Merchant ships anchor abreast of the city in from 7 to 8 fathoms; but the water is so deep that they may come close to the quays. The *inbat*, or sea breeze, blows from morning till evening, and is always waited for by ships going up to the city. There is excellent anchorage in most parts of the gulf, merely avoiding the shoals on the N. side. Smyrna is a place of great antiquity. The excellence of its port, and its admirable situation, have made it to be several times rebuilt, after being destroyed by earthquakes. On approaching it from the sea, it has the appearance of an amphitheatre. The interior of the city does not correspond to its external appearance, the streets being for the most part narrow, dirty, and ill-paved. Owing to the want of cleanliness and of all sorts of precautions, on the part of the Turks, Smyrna is frequently visited by the plague. The trade of this city is more extensive than that of any other in the Turkish Empire, and Smyrna is the great steam centre for the whole Levant. The caravans from Persia are chiefly composed of Armenians. They arrive and depart at fixed periods, which are nearly identical with those of the arrival and departure of most of the foreign ships frequenting the port. But it is now connected by railway with Ghuzel-Hissar, or Aidin, near the Mendere, 62 m. S.E. of Smyrna. Bargains are principally effected by Jew brokers, many of whom have amassed considerable fortunes. The principal articles of import consist of furs, iron, butter, etc., from Odessa and Taganrog; and of cotton-stuffs and twist, silk and woollen goods, coffee, sugar, cochineal, and dye-woods, iron, coal, tin and tin plates, rum, brandy, paper, cheese, glass, wine, etc., from Great Britain, France, Italy, the U. States, etc. The exports consist principally of cotton, which is the most valuable article, madder, dried fruits, valonia, opium, sponges, carpets, silk, wool, boxwood, emery-stone, drugs, yellow-berries, galls, wax, copper, hare-skins, goats' wool, etc. Pop. 150,000.

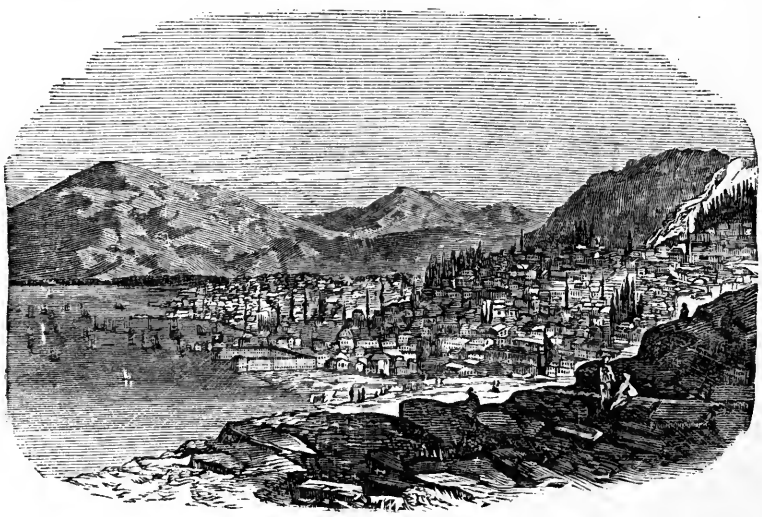

Fig. 480. — Smyrna.

Trebizond, a town of Asia Minor, on the S.E. coast of the Black Sea, lat. 41° 1′ N., lon. 39° 45′ 48″ E. The old town is built on a rock rising rapidly from the sea. It is a place of great antiquity; and from the year 1203 to the final subversion of the Eastern empire by Mohammed II., in the 15th century, was the seat of a dukedom, or, as it was sometimes called, an empire, comprising the country between the Phasis and the Halys. Its fortifications are still of some strength, at least for a Turkish city. The space included within the walls is not of great extent; but the chief part of the western town lies without these walls. The houses are mean in their outward appearance, and comfortless within. The increase in the commerce of Trebizond, in consequence of its becoming the entrepôt for the transit trade with Persia as well as for the trade with the adjacent countries, led to its extension and improvement. Trebizond has two ports, one on the W. and one on the E. side of a small peninsula, or point of land, projecting a short way into the sea. That on the E. is the best sheltered, and is the place of anchorage for the largest ships. It is, however, exposed to all but the S. gales; but it does not appear that, with ordinary precaution, any danger need be apprehended. The ground, from ¼ to ½ m. E., from the point, is good sand and clay, and holds extremely well. Ships moor with open hawse to the N., and a good hawser and stream anchor on shore, as a sternfast. At night, the wind always comes off the land. There is a fixed light on the point, and there is a second light at Platana, about 6 m. W. In antiquity, and in more modern times, previously to the conquest of Constantinople by the Turks, and the exclusion of all foreign vessels from the Black Sea, Trebizond was the seat of an extensive trade. Any one, indeed, who casts his eye over a map of W. Asia, must be satisfied that this city is the natural emporium of all the countries to the S.E. of the Black Sea, from Kars on the E., round by Diarbeker to Amasia on the W. Erzeroum, the principal city of Armenia, is only about 135 m. S.E. from Trebizond. Its merchants are distinguished by their superior attainments, and by their enterprise and activity. Of the exports, silk is the most important; and next to it are raisins, nuts, saffron, tobacco, copper, wax, shawls, beans, galls, leeches, etc. Pop. 40,000.

Turkey-Red. See Dyeing (Red Colors on Cotton), and Madder.

Turmeric, a name for the tubers of the *Curcuma longa*, which are bitter and aromatic, and largely used in the East as an ingredient in curries. Turmeric is imported into this country as a dye-stuff, and used to color butter. The coloring matter of

the dried root is bright yellow. — White paper, dyed by an alcoholic turmeric, is a very sensitive test for alkalies.

Turn, the twist of a rope round a cleat or belaying pin. — A rota or spell of duty. — A pit sunk in some part of a drift.

Turn-Bench, a simple and portable lathe used by clock and watch makers.

Turner, one who shapes articles in a lathe, a worker on ivory, hard woods, pottery-ware, etc.

Turning, the process by which a circular form is given to wood and other materials by means of a lathe and cutting tools, as in wood or metal *T.*: or by the thrower's wheel, which is a species of lathe, with shaping instruments, and in the manuf. of earthenware. The lathe by which ordinary wood *T.* is effected, called *T.-lathe*, is a machine for moving the material to be wrought in such a manner that, being fixed opposite to the tool, any point in the circumference will act upon the whole circle in exactly the same manner.

Turnip, the *Brassica rapa*, a biennial plant, native of Europe and the temperate parts of Asia, growing in borders of fields and waste places. It has been long cultivated, and is to be found in every garden of the temperate and cold parts of the world as a culinary esculent; in many countries it is also extensively grown in fields for feeding cattle and sheep. The cultivated varieties are very numerous. In them, the upper part of the root assumes a globose, oblong, or roundish depressed form. Some are common to the garden and the farm, and some of the largest kinds attain such a size as to weigh 20 or 25 lbs. Although the *T.* is of great value for feeding cattle, it is not very nutritious, no less than 90 to 96 parts of its weight actually consisting of water.

Turn-Spit, a clock-work machine for cooking.

Turn-Table, an iron revolving platform for removing carriages from one line of rails to another.

Turpentine [Fr. *térébenthine;* Ger. *Terpentin;* It. *trementina*], a name for several resinous juices of trees, chiefly of the pine tribe. These juices agree in most of their properties, being originally fluid and transparent, of a strong and rather pleasant odor, and a pungent taste; inflammable, and soluble in oils, alcohol, and ether, but not in water. When distilled, they yield an essential oil, called *oil* or *spirit of T.*, and a solid matter (see ROSIN) is left in the still. The common American or white *T.* of commerce is obtained from *Pinus australis* and *Pinus tæda*, which grow profusely in the Southern States, particularly in North Carolina, where the largest portion of the *T.* and spirit of *T.* used in, and exported from, this country is produced and distilled. Venice *T.*, obtained from the larch, *Larix Europæa*, is a ropy liquid, of a transparent brownish or greenish color and a bitter taste. Cyprian, Syrian, or Scio *T.*, obtained in Scio from *Pistacia terebinthus*, has the odor of fennel and an aromatic taste like mastic. For Canada *T.* see CANADA BALSAM. Our exports of *T.* and rosin for the year 1879 are given under ROSIN. During the same year, 7,575,556 gallons of spirits of *T.*, valued at $2,045,-673 were exported from the U. States, chiefly to England, Ireland, Belgium, Germany, and Holland. *Imp.* duty: Venice *T.*, free; spirits of *T.*, 30 cts. per gallon.

Turquoise [Fr. *turquoise;* Ger. *Türkiss;* It. *turchino;* Sp. *turquesa*], a precious stone, in considerable estimation. Its color, which is its principal recommendation, is a beautiful celestial blue, which changes into pale-blue, and is sometimes tinged with green. Sp. gr. 2.6. It possesses a somewhat waxy lustre, and is somewhat translucent, although generally opaque. It is much worn in necklaces, and every part of ornamental jewelry, from the size of a pin's head to that of an almond: it contrasts beautifully with brilliants or pearls set in fine gold, and appears to most advantage when cut spheroidal. The finest kinds of *T.* are obtained from Persia.

Turret, a small slender tower.

Turret-Ship, a species of iron-clad war vessel, in which the guns are carried in one or more iron turrets, which may be rotated either by hand-winches or by a steam-engine, so that the guns may be fired in any required direction.

Turtle, a name given to the marine tortoise, some species of which, especially the green turtle, found on the coasts of almost all the islands and continents of the torrid zone, are highly prized as food. They abound particularly in the Cayman Isles, in the West Indies, from whence they are shipped alive to our Atlantic cities, to be made into turtle soup. The number annually taken amounts to many thousands, each one weighing from 50 to 500 lbs. *Imp.* free.

Turtle-Shell, a common name for the shield-plate or armor of all tortoises. See TORTOISE-SHELL.

Tusk, a long fang or tooth. The tusks of the elephant form an important article of commerce.

Tutenag, an alloyed metal made by the Chinese in the proportion of 8 parts of copper, 3 of nickel, and 6½ of zinc; which is fusible, very hard, and not easily rolled; but well adapted for casting. *Imp.* duty: in blocks or pigs, 1½ cts. per lb.; in sheets, 2½ cts. per lb.; manuf. of, 35 per cent.

Tutwork, a miner's name for piece-work or task-work.

Tuyere, TWEER, a round aperture made in one of the sides of a crucible to admit the extremity of the blast-pipe, through which the air, in a high state of compression, is forced into the furnace.

Twankey, the most inferior kind of green tea, largely used for mixing with tea of a better quality.

Tweed, a light woollen stuff, much used for overcoats. — A milled Scotch trousering or wrapper worn by shepherds and others.

Tweer. See TUYERE.

Tweezers, a small kind of pincers or holders; nippers to pluck out hairs from the face.

Twibill, a tool of different kinds for mortising, paving, etc.; a mattock; a reaping-hook.

Twill, a particular kind of textile goods, in which the weaver gives a sort of diagonal ribbed appearance to the surface. The weft threads do not cross alternately under and over the warp, as in plain weaving, but over two and under one, over three and under one, over three and under one and two alternately, or with other variations. Sometimes it passes over six at once, and then under a single one; and in special kinds of satin it may even be fifteen at once. All twilled fabrics necessarily present a twill on both surfaces, though reversed in direction. This effect is produced by increasing the number and modifying the action of the healds in the loom. *Satin, bombazine,* and *kerseymere* are three among many varieties of twill.

Twilly, a name for the willying machine.

Twine, a strong thread, cord, or string, composed of two or three smaller threads or strands twisted together. They are usually numbered as follows: Nos. 1, 2, 3, 4, flax ball twines, suitable for hardware, manufacturers, etc.; Nos. 5, 6, 7, 8, fine flax, gray and colored twine for stationers, etc.; Nos. 9, 10, 11, 12, 13, red, blue, and other colors, for druggists, etc.; Nos. 14, 16, 17, bleached

flax twine for fancy goods, cutlers, etc.; Nos. 15 and 18, jute and cotton twine, for grocers, tea dealers, etc. There are also seine twine, patent twine, gill twine, 4-ply twine, etc. Sewing twine for sails weighs at the rate of 360 to 430 fathoms to the pound. One pound of twine will sew 160 yards of seam, on an average.

Twine-Reeler, a mule doubler; a string-twister.

Twist, silk in hanks, balls, and reels, etc., for sewing, used by tailors and milliners, saddlers, bookbinders, stay-makers, etc. — A roll of tobacco. — A small roll of twisted dough baked. — A kind of cotton yarn, of which there are mule, water, and green twists: the Nos. run from 20 to 100.

Two-Decker, a vessel of war, carrying guns on two decks.

Two-Foot Rule, a carpenter's measure; a folding pocket-rule.

Two-Ply Carpet, carpeting in which two sets of threads of both warp and weft are incorporated, so as to form two thicknesses.

Tye, a rope connected with a yard, to which a hoisting tackle is attached.

Tympan, the parchment frame or panel of a hand printing-press, on which the blank sheets are put in order to be impressed when laid on the form.

Tympanum, an old form of wheel for elevating water. The *scoop-wheel* is a kind of tympanum in which the buckets are so curved as to scoop up the water into which they dip, raising a portion of the same and conducting it toward or into the axis, when it is discharged.

Type, a model or pattern. — The letters, marks, and signs of all kinds (the small sizes cast in metal, the largest cut in wood) with which books, newspapers, broadsides, etc., are printed; in a collective sense, printing-letters; print. *Imp.* duty, 25 per cent. See PRINTING.

Type-Founding. Printing types are made of a mixed metal, better than iron or copper (which, being too hard, would cut the paper), and better than tin or lead (which, being too soft, would be flattened under the action of the printing-press). An alloy of 3 or 4 of lead to 1 of antimony is found to make good type-metal; but each type-founder has his own favorite recipe.

In making these types there is first an engraved *punch*, with the letter at one end; the letter is formed by hammering and filing while the steel is in a softened state. From the punch a *matrix*, or reverse impression, is obtained, by stamping upon a small slip of copper. From the matrix a type is made by casting in type-metal; and this type is, like the original punch, worked with the letter in relief, or raised. The casting takes place in a *type-mould*, which has the matrix at the bottom, and steel sides to determine the slope and size of the body or stem of the type. The mould is hinged in two parts, in such a way as to be opened and closed with great facility. The type-metal, kept melted in a small vessel, is at hand. The caster holds the mould in his left hand, and pours the requisite quantity of metal into it with a little spoon. The type solidifies almost instantly; a spring is loosened which opens the mould; and the type falls out. So quickly is this done, that the caster can make 500 in an hour. When cold, the types have the bit of superfluous metal at the other end broken off from them; they are rubbed on a gritty stone to remove roughness, and are polished to bring the sides and ends to an exact size and shape. — Attempts have often been made to produce many types at once, either by casting or stamping; it *can* be done, and it is simply a commercial question whether the machine plan will in the end be more economical than the hand method. In Johnston and Atkinson's machine the types push one another out of the mould as fast as they are made; and then the machine performs all the operations of dressing the sides and ends of the types. In other type-founding machines the type-metal is kept in a melted state in a cylindrical iron vessel, one side of which has a spout or lip at the top; near it is a frame containing the mould. This frame has an oscillating or reciprocating motion, which alternately carries it to, and withdraws it from, the vessel. At a given instant, when the frame is close to the melting-pot, a kind of piston is moved, which allows a definite quantity of molten metal to flow over into the mould. This done, the mould is drawn backward, opened, and the hot but solidified type emptied into a tray. A current of air is kept playing against the mould to prevent it from being too highly heated. It is said that one man with this machine can cast about three times as many types as an experienced hand-caster, but that the types require more dressing.

Type-Metal. See TYPE-FOUNDING.

Type-Mould, a die, steel-punch, or matrix of brass or copper for casting types.

Type-Setting Machine. See COMPOSING-MACHINE.

Typhoon, the name given to a violent tornado or hurricane in the Chinese seas.

Typography, the art of printing, or the operation of impressing letters or words in forms of type. See PRINTING.

Tyrian-Purple, a beautiful animal dye, formerly obtained from certain molluscs, species of *Murex* and *Purpura*.

Tyroline. See ANILINE (VIOLET).

U

Udometer, a rain-gage.

Ullage, the quantity deficient in a cask, or any vessel, of being full.

Ultramarine, a beautiful blue pigment, formerly very expensive, and obtained from the variegated blue mineral called lazulite, but now artificially compounded, and greatly reduced in price. *Imp.* duty, 6 cts. per lb.

Umber, a massive mineral pigment, used by painters as a brown color, and to make varnish dry quickly. It is used either in its natural state or burnt. *Imp.* duty, 50 cts. per 100 lbs.

Umbrella, a portable folding shade, or protection against heat and rain; a screen of linen, silk, or paper, on a frame of cane, wire, or whalebone ribs or stretchers. There are in Philadelphia and New York large *U.* manufactories which furnish about seven eighths of all the *U.* sold in the U. States, the balance consisting of silk *U.* imported from France, and Scotch gingham and alpaca *U.* imported from England. Whalebone and cane frames are generally made in this country; steel frames are mostly imported from England. The sticks are usually imported in a rough state, principally from China.

Imp. duty: Silk or alpaca *U.*, 60 per cent; not silk or alpaca, 45 per cent. — Wood or cane sticks, in the rough, or no further manufactured than cut into lengths suitable for *U.*, parasols, etc., free. — Ribs and stretchers, frames, tips, runners, handles, or other parts, wholly or chiefly of metal, 45 per cent. — Sticks and frames, finished or not, n. o. p. f., 35 per cent.

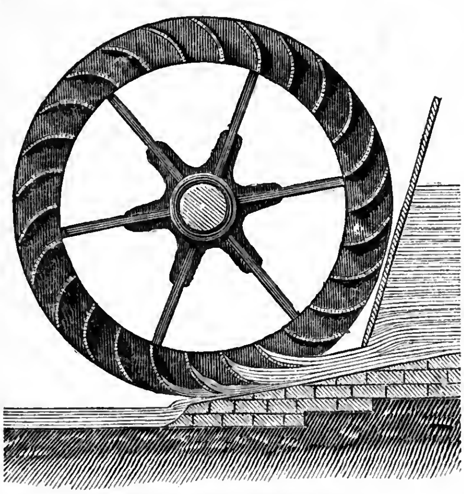

Fig. 481. — Undershot-Wheel.

Umpire, a third person chosen to decide a disputed question when two arbitrators cannot agree.

Uncia, an ounce troy, or in liquids the twentieth part of a pint. It is thus abbreviated in prescriptions, ℥.

Unctuous, fat, oily; having a resemblance to grease.

Undersell, to sell at prices lower than others in the same line and at the same place.

Undershot-Wheel, a water-wheel (Fig. 481) with a number of wash-boards or buckets, which receive the impulse of the water conveyed to the lowest part of the wheel by an inclined sluice or canal; — correlative to *overshot* wheel.

Undertaker, a contractor or manager of funerals; a coffin-maker.

Underwriter, one who grants an insurance, writing his name on the policy of insurance as answerable for a certain amount in case of loss, upon receipt of an agreed rate of premium. In England this term is limited to marine business, but in this country it is extended to other branches of insurance. The origin of the word is explained under Lloyds'.

Undock, to remove a vessel from a wet dock or basin.

Unfashionable, garments, furniture, etc., not in the present mode.

Unhairing. See Liming.

Unhang, to take a door or gate off its hinges.

Unhook, to disconnect a hook and eye.

Uniform, an official or state dress or equipment for naval, military, and other officers; a livery for police, gaolers, etc. — Articles made of the same shape or pattern.

Union, a fabric made from yarns composed of different materials, the term, however, being usually limited to goods in which cotton, flax, or jute predominates; while goods in which wool is the chief ingredient are generally called *mixed goods.* — A confederation of States. — The upper inner corner of an ensign. — A joint or connection.

Union Central Life-Insurance Co., located in Cincinnati, O., organized in 1867. *Statement*, Jan. 1, 1880: Assets, $1,498,095; liabilities, $1,188,-692. Policies in force, 4,276, amounting to $7,466,-120; premiums, $397,678. Dividends paid to policy holders, $321,442.64.

Union Fire and Marine Insurance Co., located in Philadelphia, Pa. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $500,000; net surplus, $44,802. Fire risks in force, $9,173,087; premiums, $80,998; marine and inland risks in force, $970,739; premiums, 45,229. Premiums received since the organization of the Co., $13,833,-499; losses paid, $10,249,492; cash dividends paid to stockholders, $1,702,599.

Union Fire Insurance Co., located in Buffalo, N.Y., organized in 1874. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $100,000; net surplus, $13,458. Risks in force, $2,755,587; premiums, $22,930. Premiums received since the organization of the Co., $171,979; losses paid, $73,108; cash dividends paid to stockholders, $41,000.

Union Mutual Life-Insurance Co., located in Augusta, Me., organized in 1849. *Statement*: Assets, $6,860,982.78; liabilities, $6,283,595.53; new policies, 2,339, amounting to $4,191,956; policies in force, 14,915, amounting to $26,617,766; premiums, $897,026.43; dividends paid to policy holders, $1,214,039.13.

Union Pacific R. R. runs from Omaha, Neb., to Ogden, Utah Ter., 1,034.4 m.; extension, 8 m.; total length of line, 1,042.4 m. The Union Pacific Co., besides, controls the Omaha and Republican Valley R. R., 72.2 m.; Colorado Central R. R., 292.25 m.; and Utah and Northern R. R., 210 m. This Co., located at Omaha, was chartered by act of Congress of July 1, 1862, which conceded to the Co. a land grant of 12,800 acres per mile of road, or about 12,083,227 acres; and a loan of bonds in aid of construction, amounting to $27,236,512, which had to be first mortgaged on the whole property, but was reduced to a second lien by act of Congress of July 2, 1864, which authorized a

first mortgage to an amount equal to the loan. The road was actually opened to traffic May 10, 1869, when connection was made with the Central Pacific R. R. The sales of lands down to 1879 were 1,539,297 acres, and the net proceeds from lands were $6,226,283. — *Financial statement*: Cap. stock, $36,762,300; funded debt, bonds standing after redeeming $13,774,000 by sinking funds, $50,188,000; U. S. subsidy 6 per cent bonds, $27,236,512; total standing liabilities, $114,186,812. Cost and equipment of road and extensions, $118,081,032; other investments, $10,179,780; total property and assets, $128,260,812. The financial agency and transfer office of the Co. is in Boston, Mass.

United Firemen's Insurance Co., a fire-insurance Co., located in Philadelphia, Pa. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,000; net surplus, $56,821. Risks in force, $12,376,776; premiums, $151,414. Premiums received from the organization of the Co., $419,093; losses paid, $178,527; cash dividends paid to stockholders, $104,505.

United Kingdom, a general term by which Great Britain and Ireland are designated.

United States of America, a Federal Republic of N. America, occupying the entire width of the central portion of the continent, between lat. 24° 30′ and 49° N., and between lon. 66° 50′ and 124° 30′ W. It is bounded N. by New Brunswick, the River St. Lawrence, and the whole system of lakes separating it from Canada; S. by Mexico and the Gulf of Mexico; E. by the Atlantic, and W. by the Pacific Ocean. Its greatest breadth, from Cape Cod on the Atlantic to the Pacific near the parallel of lat. 42°, is about 2,800 m., and its greatest length, from Madawaska in Maine to Key West in Florida, is about 1,600 m.; its mean length being about 2,400 m., and its mean breadth about 1,500 m. The area of this vast and powerful country is 3,057,407 sq. m., or 1,956,740,480 acres; or, if we include Alaska (which for any other purpose is left aside as constituting a separate territory), 3,634,797 sq. m., or 2,326,270,080 acres; being only 135,203 sq. m. less than the entire area of the European continent. The Republic is politically divided into 37 States, one Federal District (District of Columbia), and 11 Territories, two of which, namely, the Indian and Alaska, are not yet constituted. Pop. 50,000,000.

The present Encyclopædia, in all its parts, is an illustration of the present condition of the production, commerce, industry, and financial system of the U. States. Under their proper heads are given the commercial law and the latest attainable information and statistics regarding the American Union in subjects, — as CANALS, CONSULS, EXPORTATION, IMPORTATION, IMMIGRATION, INSURANCES, MONEY, MINT, NATIONAL BANKS, NATIONAL DEPARTMENT, POST OFFICE, PATENTS, RAILROADS, REVENUE AND EXPENDITURE, SHIPPING, etc., etc. The imports and exports of all articles of production and commerce are given under their specific names; under the name of each foreign country are condensed the statistics of its commercial intercourse with this country; also the trade, agricultural productions, and finances of each individual State under its proper head. So multiform and exhaustive is the treatment throughout this work, of all subjects pertaining to the American Union and connected with the object of the Encyclopædia (Commerce, Industry, Finance), that it is only left for us, in the following lines, to submit a short synopsis of the physical features of the whole country, and to add thereto such information as does not appear elsewhere in our pages.

Physical Features.—The U. States are traversed by two ranges of mountains, the Alleghanies and the great mountain mass of N. America, the Rocky Mountains. These divide the country into three distinct geographical regions; the Atlantic slope, descending from the crest of the Alleghanies to the ocean on the S. E.; the great Mississippi Valley, between the Alleghanies and the Rocky Mountains; and the western declivity, from the Rocky Mountains to the Pacific. The Alleghanies are a long plateau, crested with several mountain ridges, and groups separated from each other by wide and elevated valleys. They commence in Northern Alabama and Georgia, and reach their culminating point in N. Carolina, where they attain an elevation of 6,476 feet; thence passing N. E. in parallel ridges, varying in height from 2,000 ft. to 6,000 ft., and a breadth of from 20 to 100 m., through Virginia, Pennsylvania, New Jersey, New York, Massachusetts, Vermont, New Hampshire, and Eastern Canada, where they terminate in the bold headland of Cape Gaspé. The Rocky Mountains take a much greater breadth, and the culminating points reach the region of eternal snows, rising in the portion passing through the U. States to the height of 14,000 ft. This is the great mountain range of the continent, traversing it from Cape Horn to the Arctic Ocean, forming the longest continuous mountain mass on the face of the globe. Between this range and the Pacific coast are some minor mountain ridges, whose culminations in several places rise far

Fig. 482. — GREAT SEAL OF THE UNITED STATES.

above the snow line, and furnish some active volcanoes. The Mississippi River has its entire course in the territory of the republic; and the valley drained by it and its numerous tributaries is one of the most fertile tracts on the earth's surface. The Pacific section is traversed by several extensive rivers, and presents a much diversified surface, with varied and picturesque scenery; but some portions are mere desert wastes.

Lakes. — All the great lakes, with the exception of Michigan and Champlain, lie partly in Canada, the division line passing centrally through them and their connecting streams for a distance of about 1,500 m. The first (the most extensive sheet of fresh water on the earth's surface) in the series is Lake Superior, the surplus waters of which, descending through the Strait of St. Mary's into Lake Huron, which, with the accumulated waters from Michigan, pass through the St. Clair Strait and Lake, and the Detroit into Lake Erie; whence, passing over the precipice of Niagara, and through Niagara Straits enter Ontario; Lake Ontario has its outlet by the magnificent St. Lawrence, through Canadian territory, into the Atlantic Ocean. Lake Champlain, lying between New York and Vermont, is 128 m. long, and from 1 to 16 m. wide, and discharges its waters through the Sorel into the St. Lawrence. It is computed that these lakes contain 14,000 cubic m. of water, a quantity more than five sevenths of all the fresh water of the earth. The extent of the country drained by them from the N. W. angle of Lake Superior to the St. Lawrence, including also the area of the lakes themselves, is estimated at 335,515 sq. m.

Rivers. — The rivers of the U. States are of prodigious magnitude and importance. Of those flowing S. and E. the principal are the Mississippi and Missouri, which, with their tributaries, the Ohio, Arkansas, and Red River, give to the interior of the U. States an extent of inland navigation, and a facility of communication unequalled, perhaps, and certainly not surpassed, in any other continent. The Alabama and Appalachicola flow, like the Mississippi, into the Gulf of Mexico; the Savannah, Roanoke, Potomac, Susquehanna, Delaware, Hudson, Connecticut, and Penobscot, into the Atlantic;

and the Oswego, Cuyahoga, and Maumee, into the great lakes of the St. Lawrence basin. Of the rivers which have their sources W. of the ridge of the Rocky Mountains, and their embouchure in the Pacific, or in some of its arms, the principal are the Columbia, which falls into the Pacific; the San Joaquin and Sacramento, which fall into the great bay of San Francisco; and the Colorado, which, with its tributaries, after draining a vast extent of country, falls into the Gulf of California. Next to the great lakes in the basin of the St. Lawrence, the largest lake within the limits of the U. States is the Great Salt Lake, in Utah Territory. Lake Champlain, between New York and Vermont, is also of considerable dimensions. Numerous small lakes occur in New York, Maine, and especially in Wisconsin and Minnesota. The coast of the Atlantic is indented by many noble bays, as those of Passamaquoddy, Massachusetts, Delaware, and Chesapeake; and several extensive and sheltered inlets are formed by the islands of the coast, the principal of which are Long Island Sound, near New York, and Albemarle and Pamlico Sounds, in N. Carolina. The coast of the Gulf of Mexico has also many valuable inlets and back waters, and there are some, though fewer, on the shores of the great lakes. The great bay of San Francisco in California, on the Pacific, is one of the finest basins anywhere to be met with. Altogether, the U. States is furnished with some of the best harbors in the world.

Coast Line. — With the exception of a small portion of the N. E. coast, the shores of the Atlantic and Gulf are low, while those of the Pacific are mostly bold and rocky. The most important indentations on the Atlantic are Passamaquoddy, Frenchman's, Penobscot, Casco, Massachusetts, Cape Cod, Buzzard's, Narraganset, New York, Raritan, Delaware, and Chesapeake Bays, and Long Island, Albemarle, and Pamlico Sounds; on the Gulf, Tampa, Appalachee, Pensacola, Mobile, Galveston, Matagorda, Espiritu Santo, Aransas, and Corpus Christi Bays, with those about the delta of the Mississippi; and on the Pacific, San Diego harbor, Monterey Bay, San Francisco Bay, and the strait of Fuca. The length of coast line, not including indentations of the land, according to the U States coast survey, is 5,715 m., viz.: 2,349 m. on the Atlantic, 1,556 on the Gulf of Mexico, and 1,810 on the Pacific. The shore line of the great lakes, according to estimates made in the coast survey office, measures 3,450 m., viz.: Superior, 955; Michigan, 1,320; Huron, 510; St. Clair, 65; Erie, 370; Ontario, 230.

Climate. — In a country extending through 24 degrees of lat., and nearly 60 of lon., the climate must, of necessity, vary considerably. In the N., along the British frontier, the winter is very severe; during this season the snow is sufficiently abundant in the New England States to admit of the use of sledges, and the ice on the rivers strong enough to bear the passage of horses and wagons. In the summer, on the contrary, the heat is proportionately oppressive. As far S. as New York, Pennsylvania, and New Jersey, the thermometer falls in winter below zero; rising, in summer, to nearly 100° F. The climate of the Atlantic coast between lat. 41° and 45° is colder in winter, and warmer in summer, by nearly 10°, than the parts of Europe under the same parallels, and even at New Orleans, where the summer heats are intense, a winter seldom passes without frost. Snow, however, rarely falls further S. than lat. 30°, nor is it often seen S. of the Potomac River, except on mountains. The mean annual temperature of Albany is about 49° F.; of New York and Cincinnati, nearly 51°; of Philadelphia, 54°; of Natchez, 65°; and of Cantonment Brooke, in Florida, 72°. The prevalent winds are from the N. W., S. W., and S. E. The first is by far the driest and coldest, and predominates in winter; the second prevails throughout the basin of the Mississippi for most parts of the year, except during about 2 months of the winter season. The N. E. winds bring moisture, particularly in the N. part of the Union. The temperature in the country along the Pacific is a good deal higher than along the corresponding latitudes on the E. coast. The year is there divided into two seasons: the *wet*, extending from April to November; and the *dry*. In the former, the rains are frequent and heavy. In the S. parts of the coast, the dry season commences sooner and continues longer than in those more to the N.

Vegetable Products. — The forests of the E. section of this great territory comprise 140 different kinds of trees, of which about 80 attain the height of 60 ft. and upwards. Among them are numerous species of oak, ash, pine, the hickory and tulip tree, American cypress, the plane, and several kinds of magnolia and walnut. Apples, pears, cherries, and plums flourish in the N.; peaches, melons, and grapes, in the Middle States; and pine-apples, pomegranates, figs, almonds, and oranges, in the S. Maize is grown from Maine to Louisiana, and wheat throughout the Union; tobacco, as far N. as about lat. 40°, and in the W. States S. of Ohio. Cotton is not much raised N of 37°, though it grows to 39°. Rice is cultivated in S. Carolina, Georgia, Louisiana, and as far N. as St. Louis, in Missouri. The sugar-cane grows as high as 33°, but does not thoroughly succeed beyond 31° 30′. The vine and mulberry-tree grow in various parts of the Union; oats, rye, barley, in all the N., and the mountainous parts of the S. States; and hemp, flax, and hops, in the W. and Middle States.

Mineral Products. — The White Mountains consist of granite, which is also very prevalent in the greater part of New Hampshire and Maine. The Rocky Mountains and the Sierra Nevada consist principally of granite intermixed with volcanic matter. Sienite, porphyry, and greenstone occur in the N. W. part of the Appalachian chain; gneiss forms the upper regions in New York and New Jersey; most of the mountain summits S. of the Juniata River consist of silicious sandstone; and talcose mica, chlorite, and other slates, with crystalline limestone and serpentine, lie along the W. side of the primary belt, in the middle and S. parts of the Union. Blue-limestone, red-sandstone, shales, anthracite, coal-measures, and other transition formations, flank these rocks in many places. Secondary strata occupy by far the largest portions of the U States; but no strata corresponding in date with the new red-sandstone or oölitic groups of Europe appear to be present. Tertiary formations, many of which abound with fossil remains, have been found in many parts of the Atlantic slope, in Alabama, and in the S. part of the Mississippi basin; but they seem to be almost exclusively confined to these regions. The most extensive and remarkable alluvial tract is that around the mouth of the Mississippi. If we except a few small isolated fields, all the bituminous coal in the U. States lies W. of the Appalachian chain, where a vast series of coal-beds stretch from the mountains W. through Ohio, Indiana, and Illinois, and parts of Kentucky and Alabama, into the State of Missouri, and even as far as 200 m. beyond the Mississippi. Anthracite coal, or that best suited for fuel, lies at the N. extremity of this great field, in Pennsylvania, and in the W. of Virginia, the E. of Ohio and Illinois. The beds of Pennsylvania likewise contain immense and apparently inexhaustible stores of mineral oil, or petroleum, which gushes forth in streams wherever it finds an outlet. Numerous salt-springs exist in New York, Virginia, Pennsylvania, and the W. States. Iron is distributed most abundantly through the coal-measures in Pennsylvania, Ohio, Virginia, and Tennessee, where the ore contains from 25 to 33 per cent of metal. It also abounds in the N. W. States, and in one part of Vermont yields 78 per cent of iron. A large proportion of the ore found in this part of the Union is magnetic. Lead is next in importance; it is found in various places, especially in Missouri, Wisconsin, and Illinois. In some parts of Wisconsin the lead ore is so very rich as to yield from 60 to 70 per cent of lead. Copper has been found in large deposits in Michigan, in the peninsula which stretches into Lake Superior. Immense sheets or walls of native copper occur in some of the mines in this district; and it is a curious fact, that, though only recently re-discovered, they had evidently been opened and wrought, at a remote period, by the Indians. Gold has been found in small quantities in certain parts of Virginia, the Carolinas, Georgia, and Tennessee, and on a large scale in the States and Territories W. of the Rocky Mountains. Quicksilver, copper, zinc, manganese, with lime and building-stone, constitute the other chief mineral products.

Manufactures. — Protected by duties on foreign importations, manuf. have had, during the last few years, considerable development. The principal are hollow-ware, rolled iron, steam-engines and machinery, carriages, agricultural implements, cotton and woollen goods, silks, leather, boots and shoes, harness, etc., India-rubber goods, paper, oil-cloth, etc. The chief manufacturing States are Massachusetts, Pennsylvania, New York, Maine, New Hampshire, Rhode Island, Connecticut, New Jersey, Maryland, Ohio, and Illinois. For further information, see under names of each particular State, and of each article of manufacture.

Commerce. By the Constitution of the U. States it is provided that Congress shall have power, 1. To lay and collect taxes, duties, imposts, and excises, to pay the debts, and provide for the common defence and general welfare of the U. States; but all duties, imposts, and excises shall be uniform throughout the U. States; 2. To borrow money on the credit of the U. States; 3. To regulate commerce with foreign nations, and among the several States, and with the Indian tribes; 4. To establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies, throughout the U. States; 5. To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures; 6. To provide for the punishment of counterfeiting the securities and current coin of the U. States; 7. To establish post-offices and post-roads; 8. To promote the progress of science and useful arts, by securing, for limited times, to authors and inventors the exclusive right to their respective writings and discoveries; 9. To constitute tribunals inferior to the Supreme Courts; 10. To define and punish piracies and felonies committed on the high seas, and offences against the law of nations; 11. To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water; 12. To raise and support armies: but no appropriation of money to that use shall be for a longer term than two years; 13. To provide and maintain a navy; 14. To makes rules for the government and regulation of the land and naval forces; 15. To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions. — The power "to regulate foreign commerce" enabled the government at once to place the whole country upon an equality with foreign nations; to compel them to abandon their narrow and selfish policy toward us; and to protect our own commercial interests against their injurious competitions. The power to regulate commerce

"among the several States," in like manner, annihilated the causes of domestic feuds and rivalries. It compelled every State to regard the interests of each as the interests of all; and thus diffused over all the blessings of a free, active, and rapid exchange of commodities, upon the footing of perfect equality. The words being general, the sense must be general also, and embrace all subjects comprehended under them, unless there be some obvious mischief, or repugnance to other clauses, to limit them. In the case there is nothing to justify such a limitation. Commerce undoubtedly is traffic; but it is something more — it is intercourse. It describes the commercial intercourse between nations and parts of nations in all its branches, and is regulated by prescribing rules for carrying on that intercourse. The mind can scarcely conceive a system for regulating commerce between nations which shall exclude all laws concerning navigation; which shall be silent on the admission of the vessels of one nation into the ports of another, and be confined to prescribing rules for the conduct of individuals in the actual employment of buying and selling or barter. It may, therefore, be safely affirmed that the terms of the Constitution have at all times been understood to include a power over navigation as well as over trade, over intercourse as well as over traffic. — The power of Congress in laying taxes is not necessarily or naturally inconsistent with that of the States. Each may lay a tax on the same property without interfering with the action of the other; for taxation is but taking small portions from the mass of property, which is susceptible of almost infinite division. In imposing taxes for State purposes, a State is not doing what Congress is empowered to do. Congress is not empowered to tax for those purposes which are within the exclusive province of the States. When, then, each government exercises the power of taxation, neither is exercising the power of the other. But when a State proceeds to regulate commerce with foreign nations or among the several States, it is exercising the very power which is granted to Congress, and is doing the very thing which Congress is authorized to do. There is no analogy, then, between the power of taxation and the power of regulating commerce. — *Domestic Trade.* It is not doubted that the power of Congress extends to the regulation of navigation, and to the coasting trade and fisheries, within as well as without any State, wherever it is connected with the commerce or intercourse with any other State, or with foreign nations. It extends to the regulation and government of seamen on board of American ships, and to conferring privileges upon ships built and owned in the U. States, in domestic as well as in foreign trade. It extends to quarantine laws, and pilotage laws, and wrecks of the sea. It extends as well to the navigation of vessels engaged in carrying passengers, and whether steam-vessels or of any other description, as to the navigation of vessels engaged in traffic and general coasting business. It extends to the laying of embargoes as well on domestic as on foreign voyages. It extends to the construction of light-houses, the placing of buoys and beacons, the removal of obstruction to navigation in creeks, rivers, sounds, and bays, and the establishment of securities to navigation against the inroads of the ocean. It extends also to the designation of a particular port or ports of entry and delivery for the purposes of foreign commerce. These powers have been actually exerted by the national government under a system of laws, many of which commenced with the early establishment of the Constitution; and they have continued unquestioned unto our day, if not to the utmost range of their reach, at least to that of their ordinary application. Many of the like powers have been applied in the regulation of foreign commerce. The commercial system of the U. States has also been employed sometimes for the purpose of revenue; sometimes for the purpose of prohibition; sometimes for the purpose of retaliation and commercial reciprocity; sometimes to lay embargoes; sometimes to encourage domestic navigation, and the shipping and mercantile interest, by bounties, by discriminating duties, and by special preferences and privileges; and sometimes to regulate intercourse with a view to mere political objects, such as to repel aggressions, increase the pressure of war, or vindicate the rights of neutral sovereignty. In all these cases the right and duty have been conceded to the national government by the unequivocal voice of the people. It may be added, that Congress has also, from the earliest period of the government, applied the same power of regulating commerce for the purpose of encouraging and protecting domestic manufactures, and Congress has never abandoned the exercise of it for such a purpose As the end of the law of nations is the happiness and general perfection of the general society of mankind, it enjoins upon every nation the punctual observance of benevolence and good-will, as well as of justice, toward its neighbors. They ought to cultivate a free intercourse for commercial purposes, in order to supply each other's wants and promote each other's prosperity. The variety of climates and productions on the surface of the globe, and the facility of communication by means of rivers, lakes, and the ocean, invite to a liberal commerce, as agreeable to the law of nature, and extremely conducive to national amity, industry, and happiness. The numerous wants of civilized life can only be supplied by mutual exchange between nations of the peculiar productions of each; but as every nation has the right, and, if disposed to exercise it, of judging for itself in respect to the policy and extent of its commercial arrangements, the general freedom of trade, however reasonably and strongly it may be inculcated in the modern school of political economy, is but an imperfect right, and necessarily subject to such regulations and restrictions as each nation may think proper to prescribe for itself.

Army. — By the eighth section of the first article of the Constitution of the U. States, Congress is empowered in general "to raise and support armies;" and by the second section of the second article, the President is appointed commander-in-chief of the army and navy, and of the militia when called into the service of the U. States. On Aug. 7, 1789, Congress established a Department of War as the instrument of the President in carrying out the provisions of the Constitution for military affairs. By acts of Congress, approved July 28, 1866, March 3, 1869, and July 15, 1870, the number of land forces constituting the standing army of the U. States was strictly limited. Section 2 of the act of July 15, 1870, provides that on or before the 1st day of July, 1871, the number of enlisted men in the army shall be reduced to 30,000. It was subsequently enacted that from the year 1875, there shall be no more than 25,000 enlisted men at any one time. The army of the U. States is scattered in small detachments all over the country, but chiefly along the borders of the districts inhabited by the aborigines, or Indians. The term of service in the army is 5 years. As now organized, the army is composed of 10 regiments of cavalry, consisting each of 12 troops, or companies; 25 regiments of infantry, of 10 companies each; 5 regiments of artillery, of 12 batteries each; and 1 engineer battalion; besides the cadets of the military academy. The 9th and 10th regiments of cavalry, and the 24th and 25th regiments of infantry, are composed of negro soldiers, but are commanded by white officers. The army was commanded in 1879 by 1 general, 1 lieutenant-general, 3 major-generals, 6 brigadier-generals, 70 colonels, 83 lieutenant-colonels, 271 majors, 32 aides-de-camp, 610 captains, and 1,055 first and second lieutenants. — The territory of the U. States is divided for military purposes into ten departments, and these are grouped into 4 military divisions, namely, Division of the Missouri, composed of the Departments of Dakota, the Platte, the Missouri, and Texas; Division of the Pacific, composed of the Departments of Columbia, California, and Arizona; and, Division of the Atlantic, composed of the Departments of the East and the South. Independent of these divisions is the "Department of West Point," containing the Military Academy.

Navy. — The naval forces of the U. States consisted, in 1879, of 24 ironclads, 2 torpedo boats, 28 tugs, 67 other steamers, and 22 sailing vessels. In 1873, there were 51 ironclads, 69 other steamers, and 30 sailing vessels, so that there was a decrease, within the six years, of 27 ironclads, of 2 unarmored steamers, and of 8 sailing vessels, and an increase of 2 torpedo boats. From July, 1874, to July, 1875, the number of ironclads decreased by 21; all of them small monitors, constructed during the civil war, 20 of them of 483 tons burden each, with 1 or 2 guns, and 1 of 540 tons, with 4 guns. The building of new ironclads is proceeding very slowly, 3 of a burden of 2,127 tons each, and 1 of a burden of 2,125 tons, having been on the stocks for several years. By the terms of the Naval Appropriation Bill passed by Congress in 1876, the enlisted force of the navy was reduced from 8,500 to 7,500 men, in consequence of which it became necessary to withdraw a number of the vessels from active service. The U. States possess 10 navy-yards and stations, namely, Portsmouth, Charlestown, Brooklyn, Philadelphia, League Island, New London, Washington, Norfolk, Pensacola, and Mare Island. Portsmouth, New Hampshire, has an area of 63 acres; Charlestown, near Boston, of 80 acres; Brooklyn, of 80 acres; Philadelphia, 15, and Washington of 42 acres. Norfolk, Pensacola, and Mare Island are used only for temporary repairs. There are 4 "rates" in the official classification of ships of war. First-rates are all vessels of 4,000 tons and upwards; Second-rates, vessels of 2,000 to 4,000 tons; Third-rates, vessels of 900 to 2,000 tons; and Fourth-rates, all vessels under 900 tons. The navy was commanded in 1879 by 1 admiral, 1 vice-admiral, 11 rear-admirals, 25 commodores, 50 captains, 90 commanders, and 81 lieutenant-commanders. The body of commissioned officers comprised besides, at the same date, 280 lieutenants, 100 masters, 83 ensigns, and 44 midshipmen.

United States Fire-Insurance Co., located in New York City, organized in 1824. *Statement,* Jan. 1, 1880: Cap. stock paid up, $250,000; net surplus, $215,404. Risks in force, $9,842,777; premiums, $31,777. Premiums received since the organization of the Co., $2,845,370; losses paid, $1,553,365; cash dividends paid to stockholders, $1,373,119.

United States Life-Insurance Co., located in New York City, organized in 1876. *Statement,* Jan. 1, 1880: Cap. stock paid in cash, $250,000; assets, $4,940,810; liabilities, $4,109,451. Policies in force, 9,711, amounting to $17,362,693; premiums, $269,911.

Unlade, UNLOAD, to remove the cargo; to take merchandise or stores out of a vessel.

By act of Congress, July 18, 1866, it is enacted, that no goods, wares, or merchandise taken from any port or place in the U. States, on the N. E. or N. W. frontiers thereof, to a port or place in another collection district of the U. States on said frontiers, in any ship or vessel, shall be unladen or delivered from such ship or vessel within the U. States but in open day, that is to say, between the rising and the setting of the sun, except by special license from the collector or other principal officers of the port.

Unlay, to untwist the strands of a rope.

Unlicensed, acting without a recognized authority or legal permit.

Unmoor, to heave up one anchor, so that a vessel may ride at single anchor; to cast off from moorings.

Unofficial, in a private capacity, not emanating from an office, or state bureau.

Unpack, to take goods from their wrappings or cases; to unbale.

Unpaid, sent or received without the carriage, freight, or portage being paid.

Unquoted, goods not in the sale lists, or prices current; shares or stocks not dealt in or recognized in the official lists of the Stock Exchange.

Unreeve, to remove ropes or pulleys from a block or tackle.

Unrig, to take down the standing and running rigging, or ropes of a ship, leaving the bare masts, with only the stays, etc., as supports.

Unrip, to open seams; to separate, or tear clothes or sails asunder.

Unseal, to open; to take off or remove the seal which closes a letter or package.

Unseaworthy, a ship not safe, or properly found and fitted for navigation, or for carrying cargo.

Unship, to take out of its place, to remove anything.

Unsound, applied to merchandise whose value is impaired; as, meat by incipient putrefaction.

Untie, to loosen a bandage; to unbind.

Upholsterer, one who supplies the furniture and fittings for dwelling-houses.

Upholstery, the beds, curtains, furniture, tables, chairs, and general household articles sold by an upholsterer.

Upper, the part of a boot or shoe above the sole and welt, and forward of the ankle-seams.

Upper-Leather, the vamps and quarters of boots and shoes.

Upright, a timber supporting a rafter. — An iron stanchion or pillar.

Upward Tendency, indications favorable to an advance in price.

Urinal, an erection in a street for public convenience; also a portable water-proof case for travellers and others.

Urlings' Lace, a quilling bobbin net, figured; a gassed lace, a showy, low-priced substitute for pillow or thread lace.

Urn, a metal hot water receiver for the tea-table, formerly more extensively used; a vase bending outwards at the top; a measure of $3\frac{1}{2}$ gallons; a ballot-box.

Uruguay [*República Oriental del Uruguay*], a republic of S. America, bounded on the N. and N.E. by Brazil, E. and S.E. by the Atlantic Ocean, S. by the Rio de la Plata, and W. by the Uruguay, which last-named rivers separate the State from the Argentine Confederation. *U.* lies between lat. 30° 5′ and 34° 56′ S., lon. 53° 10′ and 58° 20′ W.; and has an extreme length of 350 m., by a breadth of 320 m.; area 66,716 sq. m. The constitution of *U.* is similar to that of the Argentine Republic; the president is elected for 4 years. Capital, Montevideo. Pop. 450,000.

The coast to the N. of Cape Santa Maria is low and sandy, but S. and W. of it, and on the estuary of the Plata, it is more bold and indented, presenting some fine bays and harbors. The greater portion of the surface consists of an elevated plateau, penetrated by many fertile valleys along the S. coast-line. The surface of this table-land presents a series of extensive plains, traversed by occasional ranges of hills of no great elevation, the whole being almost destitute of trees. The most important river is the Uruguay, which rises in the N.E. of the prov. of Rio Grande do Sul, Brazil, lat. 28° S., and flows N.W. 100 m., and afterwards S. S.W., uniting with the Parana to form the Rio de la Plata, lat. 34° S., lon. 61° 40′ W. Its entire course is 800 m., of which it is navigable for sailing vessels to the Great Falls, 40 m. S. of the Ibicui, and above the fall for small boats almost to its source. Its principal affluent is the Rio Negro. The climate is mild and healthy. The soil is very rich, yielding abundant crops of grain, a great variety of fruits and vegetables, sugar-cane, and cotton. Among the medical plants are the poppy, wormwood, gentian, balsam, coriander, licorice, and sarsaparilla, the last growing in great abundance along the banks of the Rio Negro. Gold, silver, lead, iron, copper, marble, agates, etc., are found; but the mineral resources are hardly developed, though several mines have lately been opened. Vast droves of horses and horned cattle run wild on the pampas, the latter furnishing the jerked and salted beef, tallow, hides, horns, and hair, which constitute the great bulk of the exports of the country. The manufactures are confined to a few coarse articles for home use. — *U.* carries on an active trade with foreign countries, but which has been declining recently. For the year 1879, the declared value of imports was $15,127,600; of exports, $15,008,746. Nearly the whole of the exports and imports pass through Montevideo. About one half of the foreign commerce is with Great Britain, and the rest with France, the U. States, Brazil, Spain, and Italy. The British imports into *U.* consist chiefly of manufactured cotton goods and of woollens. The commercial intercourse of *U.* with the U. States for the 14 years from 1866 to 1879, is exhibited in the following statement: —

Year ending June 30.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
	$	$	$	$
1866........	363,896	....	1,463,953	1,827,849
1867........	544,199	52,809	1,518,488	2,115,496
1868........	797,361	23,645	1,179,520	2,000,526
1869........	836,112	58,270	1,472,608	2,366,990
1870........	1,142,602	56,635	1,630,400	2,829,637
1871........	1,026,554	17,017	2,570,885	3,614,456
1872........	1,620,744	52,597	3,397,511	5,070,852
1873........	1,836,421	81,144	3,571,376	5,488,941
1874........	1,115,042	32,578	2,515,563	3,663,183
1875........	1,440,665	68,273	2,935,039	4,443,977
1876........	1,126,123	11,470	1,804,552	2,942,145
1877........	1,077,434	22,953	2,195,278	3,295,665
1878........	1,061,417	32,015	2,437,102	3,530,534
1879........	877,615	61,747	1,780,140	2,719,502
Total.....	14,866,185	571,153	30,472,415	45,909,753

For the year 1879, the declared value of imports from and exports to the U. States, was as follows: *Imports*, Agricultural implements, $48,572; clocks, $13,207; cotton manuf., $97,752; manuf. of iron, $17,047; edge tools, $11,177; lamps, $8,400; petroleum, $81,116; paper, $7,781; lard, $19,972; spirits for molasses, $53,362; starch, $27,008; refined sugar, $67,846; tobacco leaf, $43,360; lumber, $210,277; household furniture, $45,726. *Exports*, hides and skins, $1,532,455; hair, $66,146; fancy goods, $17,647; wool, $108,673.

There were 268 m. of railroad open for traffic in 1879, and the telegraphic lines in operation were of a total length of 996 m.

Revenue and Public Debt. — The revenue of the republic is mainly derived from import and export duties, both very largely increased in recent years. In the year 1878 the total revenue amounted to 4,552,650 pesos, and the total expenditure to 4,980,855 pesos, leaving a deficit of 428,205 pesos. The deficit was much larger in preceding years. More than four fifths of the total revenue of 1878 were derived from customs, and more than one half of the total expenditure was on account of the charges connected with the public debt. The republic owed at the end of March, 1878, a foreign debt of 42,357,695 pesos, contracted at rates of interest from 6 to 12 per cent. There are, besides, unsettled foreign claims against *U.* to the amount of 6,000,000 pesos. The amount of the internal debt is estimated at 18,000,000 pesos, exclusive of a floating debt of about 19,000,000 pesos. It was decreed by the government in June, 1869, in consequence of suspension of payments by the chief banks, that the notes of all of them should be under State guarantee, with forced currency. The amount of paper money is constantly increasing. In 1876 and 1877, the government added notes of the nominal value of 15,000,000 pesos to the already existing amount.

The *Money*, *weights*, and *measures* of *U.*, and the American equivalents, are: —

MONEY.

The *Peso*, or *Dollar*, of 100 centenas—Approximate value, $1.00.

WEIGHTS AND MEASURES.

The *Quintal* = 101.40 lbs. avoirdupois.
" *Arroba* = 25.35 " "
" *Fanega* = 1½ bushel.

The money, weights, and measures of the Brazilian empire are also in general use.

Montevideo, the capital and principal seaport of the above republic, on the N. bank of the Rio de la Plata, lat. 34° 53′ 15″ S., lon. 56° 14′ 15″ W. The town is built in the form of an amphitheatre, on a regular plan, and is well fortified. Montevideo is situated 2° 3′ 33″ W. of Cape St. Mary, the N. limit of the embouchure of the La Plata. Vessels from the N bound to Montevideo generally make this cape, entering the river between it and the small island of Lobos, in from 14 to 17 fathoms. The course is thence nearly W. to the Isle of Flores, on which is a light-house 112 ft. above the level of the sea, with a revolving light From Flores to Montevideo is 16 m. in a direct line, and the course W. by S by compass. A light-house, 486 ft. above the level of the sea, has been erected on the summit of the Montevideo, whence the town has its name. The light is visible for 25 m. in clear weather, and gives a flash every three minutes. The dial plate in the S. tower of the Cathedral is lighted with gas. The latter is built on a projecting tongue of land, the port being on its S. side. This, which is the best on the La Plata, is a large circular basin open to the S. W.; generally the water is shallow, not exceeding from 14 to 19 ft., but the bottom being soft mud, vessels are seldom damaged by grounding. It should, however, be observed that the depth of water in the harbor, as well as throughout the whole of the Rio de la Plata, depends very much on the direction and strength of the winds. The S. W. wind, called *pamperos*, blows right into the bay of Montevideo with much force, not unfrequently causing a rise of a fathom or more in depth of water! But it rarely occasions much damage to vessels properly moored with anchors to the S. W., S. E., and one to the N. The commerce of Montevideo is considerable. The great articles of export consist of animal products, or of hides, beef, tallow, hair, bones, grease, wool, etc. The imports principally consist of cottons, woollens, and hardware, flour, wine, and spirits, linens, sugar, tobacco, boots and shoes, salt, etc. A small charge is made for warehousing and porterage on passing through the custom-house. Goods may be bonded for an indefinite period, during which time they are subject to a moderate warehouse rent. Pop. 105,296.

Usage, long-continued practice; received method; custom; the ordinary course of business.

Usance, a period of *one*, *two*, or *three* months, or of a fixed number of days, after the date of a bill of exchange, according to the custom of different places, before the bill becomes due. Double or treble usance is double or treble the usual time; and half usance is half the time. When a month is divided, the half usance, notwithstanding the differences in the lengths of the months, is uniformly fifteen days. Usances are calculated exclusively of the date of the bill. Bills of exchange drawn at usance are allowed the usual days of grace, and on the last of the three days the bill should be presented for payment. See BILLS OF EXCHANGE, EXCHANGE, and DAYS OF GRACE.

Usine, a glass-house; an iron-work.

Usquebaugh, an Irish spirituous liquor, compounded of spirits, raisins, cinnamon, and cloves.

Usury, an illegal rate of interest or compensation for the use of money. See INTEREST.

Utah, a Territory of the American Union, lying between lat. 37° and 42° N., lon. 109° and 114° W.; and bounded N. by Idaho and Wyoming, E. by Wyoming and Colorado, S. by Arizona, and W. by Nevada; average length, N. and S., 340 m.; average breadth, 280 m.; area, 84,476 sq. m. *U.* is divided into 20 counties. *Salt Lake City*, the capital and largest city, is situated near the E. bank of the Jordan River, 12 m. S. E. of the Great Salt Lake, 4,200 ft. above the level of the sea. This city, which has a national bank, is the terminus of the Utah Central, the Utah Southern, and the Utah Western railroads; pop. 15,000. Pop. of the Territory, 130,000.

U. is intersected from N. to S. by the Wahsatch Mountains, the region E. of which is drained by the Colorado of the West. As in Nevada, the section W. of the Wahsatch range contains no outlet to the ocean for its numerous streams, or its lakes of salt and fresh water, several of which are of great size. Great Salt Lake is 75 m. long from N. W. to S. E., and about 30 m. broad. The water is transparent, but excessively salt, containing about 22 per cent of chloride of sodium, forming one of the purest and most concentrated brines in the world. Second in size is Lake Utah, lying 45 m. W. of Great Salt Lake, and connected with it by the Jordan River; it is 30 m. in length by 10 in width, of pure fresh water, and abounds in fish of considerable size and excellent flavor. The section lying E. of the mountains contains no lakes, its entire water system being composed of the Colorado of the West and its tributaries, including Grand, Green, San Juan, and White Rivers.

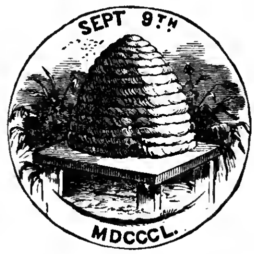

Fig. 483. — SEAL OF UTAH.

These streams frequently intersect the mountain ridges of the country, running in cañons of immense depth with nearly vertical sides; debouching from these cañons as the lower plains or valleys are reached, the streams become broad and shallow, running in beds but slightly depressed below the surface of the earth, and sometimes dividing their waters into numerous rivulets, which wind over the surface of broad, fertile meadows, irrigating the soil and producing luxuriant vegetation. The celebrated Grand Cañon of the Colorado commences in *U.* below the magnificent valley in which Green and Grand Rivers unite to form the Colorado, and extends a distance of over 400 m. into Arizona and Nevada. The two principal divisions of the surface of the Territory, lying respectively E. and W. of the Wahsatch range, are severally intersected by the Utah Mountains on the E. section, and by the Thomas, Guyot, and Iron ranges in the W. part, besides numerous minor ranges and spurs of great height, giving continual diversity to the scenery, and constituting the sources of streams of excellent water, from which the intervenient valleys derive their remarkable beauty and fertility. The E. slope is more mountainous than the portion lying within the Great Basin, and contains more numerous streams; but the high cañons intersecting the mountain ridges as channels for the water courses prevent the availability of the waters for irrigation, although not interfering with the business of stock-raising on the surrounding hills and elevated plains. The timber lands of *U.* are comprised in about 2,000,000 acres of pine, fir, and similar evergreens, on the slopes of the mountains, and extensive copses of willow, box-elder, birch, cottonwood, spruce, and dwarf-ash, in the river bottoms, added to large tracts of the soil of both valleys and hillsides, which have been planted with varieties of hard wood in order to supply the natural deficiency; the young artificial forests thriving vigorously, and promising soon to equal the requirements of the settlers with regard to such timber. — *Soil, Agriculture*, etc. The most important industries of *U.* are agriculture and horticulture, accompanied with irrigation, the facilities for which have been carried forward to a condition of great perfection, under the pursuance of a course of strenuous and systematic energy and perseverance inaugurated by the earliest settlers at Salt Lake City in 1847. Wealth and plenty have accordingly followed their labors, the result exceeding the anticipations of the most sanguine, in the certainty and abundance of the crops. The construction of reservoirs and canals has been prosecuted until a perfect network of irriguous channels extends over the settled portions of the valleys, supplying the only requisite naturally wanting for exceeding fertility, the soil being principally formed of disintegrated feldspar rock mixed with detritus of the limestone (entering so largely into the composition of the surrounding mountains), along with decomposed vegetable matter, and friable clay. The crop of cereals produced in this manner is considerably over a million bushels per annum, supplying the requirements of the local population as well as that of adjacent mining regions, 50 and 60 bushels of wheat to the acre being a frequent crop. Barley, oats, rye, buckwheat, flax, and hemp succeed equally as well as wheat, and are extensively grown; but the nights are generally too cold for large crops of maize, except in the S. W. part near Rio Virgen, where corn and sorghum thrive, and cotton is found to produce such excellent yields, as to induce considerable immigration to that section specially to engage in its culture. Potatoes, hops, garden vegetables, melons of all kinds, and all the fruits of the temperate zone are produced in abundance. Cattle-breeding and wool-growing are largely and successfully carried on. The surveyed land in 1879 was 8,178,919 acres, the arable proportion of which was set down at one fourth. Among the most important mineral deposits are gold, silver, iron, copper, zinc, lead, coal, salt, sulphur, alum, saleratus, and borax. The iron occurs in almost inexhaustible deposits of red hematite

ore of superior quality, and several foundries and manufactories of this metal have already been established in the vicinage of the mines, producing machinery as well as mechanical and agricultural implements. The most extensive and important of the coal fields of *U.* are situate in the vicinity of Coalville in Summit Co., and at the foot of the Wahsatch range in San Pete Co. Rock-salt is abundant in various sections of the Wahsatch Mountains, constituting a particular feature of the geological formation. In Salt Creek Cañon there is a mountain said to be entirely composed of this mineral in a condition almost chemically pure. A superior article of salt is manufactured from the waters of the salt lakes of the Territory. One of the most extensive beds of sulphur on the continent exists in Millard Co., about 35 m. S. of Fillmore. Building-stone of almost every description abounds. Gold, silver, lead, and copper in large quantities, and of excellent quality, are found in various sections of the Territory. The principal mining districts are Parley's Park, Big Cottonwood, Little Cottonwood, and American Fork, in the Wahsatch range; Bingham, Dry Cañon, Ophir, and Camp Floyd, in the Oquirrh range; Tintic and West Tintic, in the Tintic Mountains; and South Star, North Star, San Francisco, and Lincoln, in the S. W. part of the Territory. The ores are generally argentiferous combinations of lead and galena, with some copper ore in the S. districts. For the 10 years from 1870 to 1879 the value of gold produced in *U.* was about $3,000,000; silver, $28,000,000; lead, $7,000,000. — The manufacturing interests of *U.* are already extensive and important, embracing those of almost every necessary requirement of civilization, and furnishing employment to a large number of persons. The amount of capital invested in the leading manufactures is estimated, in the aggregate, at $2,500,000. — According to the last census, the total number of acres of land in farms was 148,361; of which 118,755 consisted of improved lands, 215 of woodland, and 29,391 of other unimproved soil; the cash value of farms under cultivation $2,297,922, exclusive of $291,390 of implements and machinery; total value of farm products, $1,973,142; of orchard stuffs, $43,938; of market-gardens, $8,700; of lumber, etc., $800. The statistics of agricultural products for the year 1879, and the number and value of live-stock in the same year, are given in this work under the names of each of the principal crops and animals. — *U.* has two national banks, with an aggregate capital of $300,000. In 1879, the Territory had 543 m. of completed railroad, distributed as follows: —

Companies.	Total length of road.	Total length in Utah.
	Miles.	Miles.
Central Pacific.	1,213.38	151.60
Summit County	7.50	7.50
Union Pacific	1,042.40	71.50
Utah Central	36.50	36.50
Utah and Northern	160.00	80.00
Utah and Pleasant Valley	40.00	40.00
Utah Southern	75.00	75.00
Utah Western	37.00	37.00
Wahsatch and Jordan Valley	44.20	44.20

Utah and Northern R. R. runs from Ogden, Utah, to Eagle Rock, Idaho, 210 m. This Co., located at Omaha, Neb., was organized April 30, 1878, as successors of the Utah Northern R. R. Co., whose road had been sold under foreclosure on March 28 of the same year. The road to Eagle Rock was completed on April 12, 1879. Cap. stock, $2,520,000; funded debt, $2,520,000. Total stock and bonds (representing cost of road), $5,040,000. The funded debt consists of 1st mortgage, 7% 30-year bonds, dated July 1, 1878, with interest payable in New York in Jan. and July, issued $12,000 per mile.

Utah Southern R. R. runs from Salt Lake City to York, Utah, 75 m. The offices of the Co. are in Salt Lake City. Cap. stock ($15,000 per mile), $1,125,000; funded debt, (1st mortgage, 7 %) $1,500,000. Total stock and bonds (representing cost of construction), $2,625,000.

Utica and Black River R. R. runs from Utica, N. Y., to Philadelphia, 87 m.; lines leased, 93 m.; total length of road operated, 180 m. The lines leased are the Black River and Morristown, and the Ogdensburg and Morristown, which are extensions of the main line; and the Carthage, Watertown, and Sackett's Harbor, and the Clayton and Theresa, which are operated as branch lines. This Co., located in Utica, was organized in 1860. Cap. stock, $1,771,720; funded debt, $1,112,000. Cost of construction and equipment, $2,797,638.

Utica, Chenango, and Susquehanna Valley R. R. runs from Utica to Greene, N. Y., 76 m.; branch line from Richfield Springs, N. Y., to Junction, 22 m.; total length, 98 m. This Co. has its office in New York City; it was organized in 1866. The road, which was opened in 1872, is leased to the Delaware, Lackawanna, and Western, at a rental of 6% on capital stock. Cap. stock, $4,000,000.

Utrecht-Velvet, a kind of velvet used for decorations, furniture, upholstery, and carriage linings.

Uvate, a conserve made of grapes.

V

V, as a numeral, denotes 5, or with a dash over it ($\bar{V}$), 500.

Vacoa, a name for a species of screw pine, the *Pandanus utilis*, which abounds in the Mauritius and Bourbon, where, from the tough, longitudinal fibres of the leaves, sacks for colonial produce are made. The leaves are cut every second year, and each plant yields enough for two large bags.

Vacuum-Pan, a pan used for boiling saccharine juices *in vacuo* in the process of making sugar.

Vacuum-Pump, a pump attached to a marine steam-engine, and used for withdrawing the air from the boiler, in order that it may be filled with water forced in under atmospheric pressure.

Vadari, a vernacular name in India for the jujube-tree, *Zizyphus jujuba*, which affords a large and very pleasant fruit, called ber and berree. See JUJUBE.

Vade-Mecum, a book of ready general reference; a manual of instruction, or recipes.

Valance, a mixed stuff, used for hangings for a window, bedstead, etc.

Val di Mazara. See ITALIAN WINES.

Val de Peñas. See SPAIN (WINES OF).

Valencias, raisins prepared by dipping the bunches of grapes into a hot lye made of wood ashes, oil, and lime, and then dried in the sun. They are used for pastry, while the Muscatels, dried on the vine, are eaten uncooked for dessert.

Valencienne. See LACE.

Valentine, an ornamented billet-doux, or printed love-letter with verses and devices, sent out extensively on the 14th of February, St. Valentine's day. They are sold by stationers.

Valerian, the common name for a genus of plants which have stimulant and aromatic qualities. The true Valerian, *Valeriana officinalis*, is a remarkable feline stimulant. All the species have some medicinal properties.

Valet, a man-servant; a personal attendant on a gentleman when dressing.

Valise, a small leather portmanteau or carpet-bag.

Valonia, a commercial name for the large capsules or acorn cups of the *Quercus ægilops*, which form a very considerable article of export from the Morea and the Levant. The more substance there is in the husk, or cup of the acorn, the better. It is of a bright drab color, which it preserves so long as it is kept dry; any dampness injures it, as it then turns black, and loses both its strength and value. It is principally used by tanners. Though a very bulky article, it is uniformly bought and sold by weight. A ship can only take a small proportion of her registered tonnage of valonia, so that its freight per ton is always high. *Imp.* free.

Valparaiso. See CHILI.

Valuation, estimated worth; value set upon a thing; as, the goods sold slightly in excess of the *valuation*.—Appraisement.

Value, the *bona-fide* worth of anything. The exchangeable *V.* of commodities depends, at any given period, partly on the comparative facility of their production, and partly on the relation of the supply and demand. If any two or more commodities respectively required the same outlay of capital and labor to bring them to market, and if the supply of each were adjusted exactly according to the effectual demand; that is, were they all in sufficient abundance, and no more, to supply the wants of those able and willing to pay the outlay upon them and the ordinary rate of profit at the time, they would each bring the same price, or be exchanged for the same quantity of any other commodity. But if any single commodity should happen to require more or less capital and labor for its production, while the quantity required to produce the others continued stationary, its *V.*, as compared with them, would in the first case rise, and in the second fall; and, supposing the cost of its production not to vary, its value might be increased by a falling off in the supply, or by an increase of demand, and conversely. But it is of importance to bear in mind that all variations in price arising from any disproportion in the supply and demand of such commodities as may be freely produced in indefinite quantities are temporary only; while those that are occasioned by change in the cost of their production are permanent, at least as much so as the cause in which they originate. A general mourning occasions a transient rise in the price of black cloth; but, supposing that the fashion of wearing black were to continue, its price would not permanently vary; for those who previously manufactured blue and brown cloths, etc., would henceforth manufacture only black cloth; and, the supply being this way increased to the same extent as the demand, the price would settle at its old level. When the price of a freely produced commodity rises or falls, such variation may evidently be occasioned either by something affecting the commodity, or by something affecting the *V.* of money. But when, instead of being confined to one, the generality of commodities rise or fall, the fair presumption is that the change is not in them, but in the money with which they are compared. Exclusive, however, of the commodities now alluded to, there is a considerable class whose producers or holders either enjoy an absolute or a partial monopoly of the supply. When such is the case, prices depend entirely or principally on the proportion between the supply and demand, and are not liable to be influenced, or only in a secondary degree, by changes in the cost of production. Prices have been often affected by variations in the cost and supply of gold and silver, whether arising from the exhaustion of old, or the discovery of new mines, improvements in the art of mining, changes of fashion, etc. Hence it is that tables of the prices of commodities, extending for a considerable period, communicate far less solid information than is generally supposed, and, unless the necessary allowances be made, may lead to the most unfounded conclusions. The real *V.* of any commodity depends on the quantity of labor required for its production; but supposing that we were to set about inferring this real *V.*, or the ultimate sacrifice required to obtain the commodity, from its price, it might happen (had the quantity of labor required for its production declined, but in a less degree than the quantity required to produce gold and silver), when its *V.* would appear to rise when it had really diminished. When, however, the rate of wages, as well as the price of commodities, is given upon authentic data, a table of prices is valuable, inasmuch as it shows the extent of the command over the necessaries and con-

veniences of life enjoyed by the bulk of the community during the period through which it extends. See APPRAISEMENT.

Valued Policy, an insurance policy in which a fixed value is given to the articles insured, so as to avoid the necessity of proving the value in case of loss.

Valuer, an appraiser; one who rates or estimates the worth of anything.

Valve, anything that opens over the mouth of a vessel; especially, in hydraulics, a lid contrived to open one way, to admit a fluid into a tube, but which shuts when pressed from the other, to prevent its return. Among the many varieties of *V.* employed in mechanics may be mentioned the *slide* or *sluice-V.*, where the orifice is opened by drawing up a plate; the *flap-V.*, which opens and shuts like a door; the *pot-lid V.*, where the orifice is closed by shutting down upon it a disk of metal; the *ball-V.*, where the orifice is closed by a ball; and the *throttle-V.*, where a disk of metal turning on a spindle passing through its edge may be made to stand across a pipe, and so close the opening.

Vamp, the upper leather or covering of a shoe above the sole.

Van, a large covered wagon for pleasure excursions, etc.

Van Diemen's Land. See TASMANIA.

Vancouver Island, an island in the Pacific Ocean, forming part of the Canadian province of British Columbia. It lies between lat. 48° 20′ and 50° 55′ N., lon. 123° 10′ and 128° 20′ W., and is separated from the mainland by a channel, called in various parts by the name of Queen Charlotte's Sound, Johnstone Strait, Gulf of Georgia, and Juan de Fuca Strait. It is about 270 m. in length, with an average breadth of 50 m.; its area has been roughly estimated at 12,500 sq. m., the greater part of which is mountain and barren rock. It is supposed originally to have been part of the continent of North America. Gold is found in increasing quantity. Coal is abundant, and finds a ready market in San Francisco. *Victoria*, the chief town, is the capital of British Columbia. Pop. 6,000.

Vandyke, an indent or scallop to a flounce or border, etc.

Vandyke-Brown, a pigment of a fine, deep, semi-transparent brown color.

Vane, a flag or weather-cock at the mast-head of a ship, or on a steeple, etc., to indicate the direction of the wind.

Vang, a seaman's term for a rope for steadying the peak end of a gaff.

Vanilla, an exquisite perfume and aromatic, the thin pod-like capsule of the *V. planifolia*, a native of Central and South America. When gathered, the fruit is exposed to the sun and dried to a certain degree, then tied up into bundles of fifty pods each, and packed in tin boxes for shipment. It is largely cultivated in the Mexican province of Vera Cruz, and comes to us chiefly from the port of that name. *V.* is one of the most esteemed of all aromatics, and very expensive, costing $25 or $30 the lb. It is much used in flavoring chocolate, cakes, sweetmeats, liqueurs, and iced beverages.

Vanning, a rocking motion given to a shovel with ore, by miners.

Vara, a measure of length in Spanish countries, answering to the yard, but generally something under 3 feet. Usually 100 *V.* are considered equal to 90 yards. The solid *V.* of Spain is 20.561 cubic feet.

Varicose-Stockings, elastic or bandaged stockings for giving pressure and support to swelled veins in the legs.

Variegated, mottled; stained with different colors.

Varina's-Roll, a kind of tobacco generally plaited round a thick stick, very much like C'naster.

Varnish. Almost all *V.* consist of resins or gum resins dissolved in spirit or some other liquid. The varieties are very considerable; copal, mastic, lac, benzoin, colophony, amber, animé, sandarach, are among the solids or resins; alcohol, ether, naphtha, turps, sweet oil, linseed oil, are among the solvents or liquids employed; and various colors are given to the *V.* by the use of indigo, saffron, cochineal, gamboge, annotto, turmeric, and other substances. It follows from this threefold list that the number of different *V.* may be varied almost infinitely; but copal, amber, and animé are the chief among *oil V.*; and mastic, lac, and sandarach the chief among *spirit V.* The former group, being most durable, and taking the best polish, are used by coach-makers, japan-workers, and house decorators; the latter group consists of *V.* not suited for much exposure to the air, but adapted for cabinet-work, lacquer, pictures, maps, and toys. The manufacture of *V.* is one requiring great experience; for if too much spirit be used, they crack in drying. To remedy this, oil of turpentine and linseed or poppy oil are added, to prevent too hasty evaporation; if, however, too much is added, the *V.* takes too long to dry.

Black V. Take any *V.* of the class you wish, 16 parts; lampblack, 2 parts. Grind the black in a small quantity of the *V.*, then mix it with the remainder. — *Canada V.* Clear balsam of Canada, 4 oz.; camphene, 8 oz. Warm gently, and shake together till dissolved. This *V.* is for maps, drawings, etc., which must be first sized over with a solution of isinglass, taking care that every part is covered. When dry, the *V.* is brushed over it. — *Chinese V.* Mastic, 2 oz.; sandarach, 2 oz.; rectified spirit, 1 pint. Close the matrass with bladder, with a pin hole for the escape of vapor; heat to boiling in a sand or water bath, and when dissolved strain through linen. — *Gold V.* Turmeric, 1 drachm; gamboge, 1 drachm; oil of turpentine, 2 pints; shell-lac, 5 oz.; sandarach, 5 oz.; dragon's blood, 7 drachms; thin mastic *V.*, 8 oz. Digest, with occasional agitation, for fourteen days, in a warm place; then set it aside to fine, and pour off the clear. — Many other *V.* are given under their proper heads. See COPAL, LAC., etc.

Vase, a large cup with handles; a kind of urn.

Vat, a large wooden or metal cistern or tub. — The liquid-measure of Belgium and Holland, containing 100 kannen or litres corresponding to the French hectolitre, = 22.01 gallons. The shipping vat weighs 2204.74 lbs. The solid measurement vat of Amsterdam contains 40 cubic feet; the wine vat, 241.57 gallons, and the vat for olive-oil, 225.45 gallons.

Vault, an arched roof. — An underground apartment, generally used as a store for wine, and other articles not injured by damp.

Veal, the flesh of the calf.

Vedette, VIDETTE, a mounted sentinel; an outpost; one sent out to reconnoitre.

Vedro, the principal Russian measure for liquids = 2.7051 gallons, and containing 100 charkeys. This measure was definitively determined at 750 cubical inches for its contents; 100 vedro are equal to 270.51 gallons, and 100 gallons = 36.97 vedro.

Veer, to let out, as slacking a cable or hawser; to change, to shift suddenly.

Vegetable, a common name for all plants and roots raised for food, but not for fruits and grains.

Imp. duty: all crude or raw *V.*, n. o. p. f., 10 per cent; desiccated and compressed, 35 per cent; in a crude state, used exclusively in dyeing or in compressed dyes, free.

Vegetable-Ivory, a name given to the osseous albumen in the nut of a dwarf South American palm, the *Phytelephas macrocarpa* (Fig. 484). These nuts (called corossos) are much used by turners for many ornamental purposes, in imitation of elephant ivory. *Imp.* duty, 35 per cent.

Vegetable-Leather. See LEATHER (ARTIFICIAL).

Vegetable-Marrow, a variety of gourd, the *Cucurbita ovifera*, used as a pot-herb in its intermediate or half-grown state.

Vegetable-Scarlet. See CARMINE.

Vegetable-Tallow, a substance resembling tallow, obtained in China in great quantities from the solid sebaceous covering of the seeds of *Stillingia sebifera*, a tree that is extensively cultivated in that country. The tallow, which is brittle, white, opaque, and tasteless, is preferred to animal tallow in making candles. It is regarded as nearly pure stearine. See BAYBERRY TALLOW.

Fig. 484. — VEGETABLE-IVORY TREE.

Vegetable-Wax, a kind of wax obtained from the candleberry myrtle and other sources. See CANDLEBERRY MYRTLE and WAX-PALM.

Vehicle, a carriage of any kind. — The means of carrying out any operation. — The simpler articles in which apothecaries mix up more powerful drugs, etc.

Veil, a piece of light gauze or lace, worn by ladies to protect or cover their faces; lace veils should be free from stiffness, and if figured the objects should be neatly finished, the net fine, and the color decided, — if intended for black, not of a bluish tinge.

Vein, a stratum of ore or mineral. — To stripe or mottle, to marble, etc.

Vellon, a money in which accounts are kept in many parts of Spain. The Spanish term strictly means copper coin.

Vellum. See PARCHMENT.

Velocimeter, an apparatus for measuring the rate of speed of machinery.

Velocipede, a propelling machine, a light seat or road carriage, worked through the agency of a lever, connecting rod, and crank, by the pressure of the feet on pedals attached to the wheel or wheels.

Velours, a kind of velvet or plush, manufactured in Prussia, partly of linen and partly of double cotton warps with mohair yarn weft.

Velours d'Utrecht, a woollen or goats'-hair velvet, made in the Netherlands for upholstery purposes; Utrecht-velvet.

Velte, a French measure for brandy, reckoned in Cognac at 1.61 imperial gallon; in Bordeaux at 1.58 do.; and in Nantes at 1.24 do.

Velvet [Fr. *velours;* Ger. *Sammet;* It. *velluto*], a beautiful silk fabric, of a compound texture; having, in addition to the warp and shoot of plain silk, a soft shag or *pile* on the outside, occasioned by the insertion of short pieces of silk thread doubled under the shoot; the other side being a strong close tissue. Its richness depends upon the relative number of the pile threads; and manufacturers accordingly designate different qualities as velvet of two, four, or six threads, according to the number. Velvet is now also made of cotton; a strong kind of which, called *velveteen*, is used for men's apparel. *Imp.* duty: see COTTON and SILK.

Velvet-Dresser, a cleaner or dyer of velvet.

Velveteen. See VELVET.

Velvet-Moss, a name for the *Gyrophora murina*, a lichen used in dyeing, obtained in the Dorrefeldt Mountains of Norway.

Velvet-Pile, a kind of carpet with a long soft nap.

Velvet Ribbons, ribbons of various widths and qualities, composed of silk, manufactured like velvet.

Vend, a sale; the whole quantity of coal sent from a colliery in the year.

Vendor, one who disposes of anything.

Veneer, a thin section or sheet of choice fancy wood, for overlaying furniture. By the aid of beautifully adapted circular saws, worked by machinery, veneers are often cut of the thickness of one fourteenth of an inch, a little thicker than a sheet of writing-paper.

Veneering is the fastening of a thin sheet of veneer upon a substratum of commoner wood. The veneer and the wood are both roughened with a *toothing-plane*, the better to hold the glue. Both, when made quite warm, are plentifully coated with glue; the veneer is laid on the wood, with the glued surfaces in contact; clamp-screws are fixed on temporarily, to keep the veneer tightly pressed down in every part; and by the time the glue is set and dry, the veneer has become firmly united to the foundation. The pressure is so great that very little glue remains within, but the union is perfect. This work requires care even when the surface of the foundation is flat; but when it is round, hollow, ogee, or curved in any other way, tools called *veneering-hammers* are used, to press the veneer forcibly in every part; the two pieces of wood and the tools are kept hot during this process; and, if the surface be large, many men are briskly employed upon it at the same time. A peculiar kind of cabinet-work called *press-work*, of recent introduction, consists in making the entire substance of the wood by means of several veneers placed one upon another. Five, seven, or even nine thicknesses are used; glue, heat, and pressure being the modes of insuring perfect adhesion. The grain of the veneer is made to cross in different directions. Being very strong and yet very light, this pressed work is used for chair-backs and other articles of furniture. The inner veneers need not be of such choice quality as the outer.

Venetian Blind, laths of wood strung together serving for a window-blind, and which can be raised or lowered by a string.

Venetian Door, a door lighted by panes of glass on each side.

Venetian Red, a scarlet ore when pure, but the colors usually sold under this name are prepared from sulphate of iron. Venetian red is sold either in lumps or in powder.

Venezuela (United States of), a republic of S. America, in the N. E. portion of that continent, bounded N. by the Caribbean Sea, W. by the U. States of Colombia, E. by British Guiana, and S. by Brazil; between lat. 1° 20′ to 12° 25′ N., lon. 59° 45′ to 73° 17′ W.; greatest length from E. to W., 750 m.; average breadth, 550 m.; area, 426,-

712 m. The principal cities are Carácas, the capital (pop. 48,897), Valencia (28,594), Barquesimeto (25,664), and Maracaybo (21,954). The constitution of *V.* is designed on the model of that of the U. States of America, but with considerably more independence secured to provincial and local government. *V.* is divided into 20 States, 1 Federal District (Carácas), and 1 Territory; total pop. 1,784,194. The States have each their own legislature and executive; the legislation for the whole republic is vested in a Congress of two houses, called the Senate and House of Representatives; the President, elected for a term of two years, has no veto power.

The Venezuelan coast line extends from the New Granadian boundary, in lon. 73° 17′ W., to the S. E. point of the delta of the Orinoco, a distance of 1,584 m., of which about 150 m. are washed by the Atlantic Ocean, and the remainder by the Caribbean Sea and the Gulf of Paria. The Atlantic seaboard is very low, and is occupied by the delta of the Orinoco, whose many mouths have caused the formation of numerous islands covered with vegetation. The peninsula of Paria separates the gulf of that name from the Caribbean Sea. This land-locked gulf has bold and rocky shores, with several small harbors on the S. shore of the peninsula. These rocky shores continue as far as Barcelona, a distance of 72 m., and have, here and there, several good harbors. Next comes a low, marshy line of coast, 128 m. long, to Cape Codera, beyond which the coast range approaches the shore, and, among others, presents the important harbor of La Guayra. The coast thenceforward, as far as the Lake of Maracaybo, is again low and sandy, with much of its surface covered by swamps and lagoons. — Of the 32 ports, those of La Guayra and Puerto Cabello are most frequented by foreign shipping. The fortifications of La Guayra have been lately restored, and are to be supplied with a complete armament. Cumaná, at the mouth of the Gulf of Cariaco, is well sheltered and defended, as is also the less important port of Barcelona, on the banks and near the mouth of the Neveri. The harbor of Coro, though much exposed, is the seat of an active trade with the West Indies; but this port and that of Maracaybo on the gulf of that name were in 1875 closed to foreign traffic, and vessels to and from them are now entered and cleared at Puerto Cabello. Ciudad Bolivar (formerly Angostura), on the Orinoco, 240 m. from the sea, is the entrepôt for the products of all the regions drained by that river and its more important affluents, two of which, the Meta and Apure, are navigated by steam. No fewer than 71 islands fringe the coast, the largest being that of Margarita, which constitutes a State, and all being of volcanic origin except those in the various river mouths and in the outlet of Lake Maracaybo, which are accumulations of mud or sand. The larger islands after Margarita are Chimana, Caraca, and Borracha off the Barcelona coast; Tortuga, further seaward; Orchila or Orchilla, affording large quantities of the dye of that name; the Roques and Aves, W. of Orchila; and Blanca, due N. from Margarita. Nearly all these islands are inhabited by large numbers of goats. — Upward of 1,000 rivers drain the territory of *V.*, all but 12 of which have their entire course within its limits. The Orinoco, ranking third among the rivers of S. America, has a course of 1,500 m., pours into the ocean by 17 mouths the waters of over 400 navigable tributary streams, and drains a region of 250,000 sq. m. The Rio Negro, rising in Colombia, flows through the S. W. corner of *V.*, receiving an extensive tribute from the Orinoco by the Cassiquiare, whereby navigable communication is established between the Orinoco and Amazon. The principal lakes are those of Maracaybo and Valencia. — *V* has three distinct mountain systems, viz.: the E. Andes, ranging through the N. and N. W ; the Sierra de Bergantin in the N. E ; and the Sierra de Parima on its S border. Several peaks attain an altitude of over 15,000 ft. above sea level. The face of the country presents mainly but two aspects: the extensive table-lands, which, according to their elevation are named *llanos*, *mesas*, *paramos*, and *punos*, dotted here and there with peaks of considerable elevation; and the low, flat, marshy lands of the seaboard and river and lake basins, overflowed during a part of the year, but some of them, especially in the interior, abundantly fertile during the remainder. The soil, except in the sandy regions of the coast and the lofty and arid paramos, is for the most part exceedingly fertile. — *V.* is rich in minerals, producing gold, silver, copper, tin, lead, iron, coal, salt, asphaltum, and petroleum. Mining is beginning to attract a good deal of attention. The climatic features of *V.* resemble those of Colombia. There are two seasons in the year, — the *wet* and the *dry;* these combine to produce a perpetual rich vegetation. — The principal products, cacao, coffee, sugar, indigo, cotton, tobacco, sago, dye and furniture woods, vanilla, and many kinds of fruit, are extensively reared, and agriculture, while generally practised, is but imperfectly developed. Maize and pulse form the principal crops. — *Manuf.* Trifling. — The chief industries are agriculture and cattle rearing. Continued internecine strife until lately, and lack of adequate implements and of suitable means of transport to the coast, have materially retarded development; but much has been done since 1873 by Gen. Guzman Blanco's government toward building roads and extending the navigation by steam of the great rivers, lagoons, and lakes of the country. The manuf. include cotton fabrics both by hand and machinery, hammocks, hats, cordage, etc. ; in Mérida, woollen carpets, tastefully variegated with brilliant colored flowers from a native dye, are extensively made; shipbuilding is carried on in Puerto Cabello; numerous brickyards are found in different parts of the republic; and several thousand persons are employed in manufacturing cigars and cigarettes, exquisite preserves and sweetmeats, and cacao. Several kinds of oil are made, especially cocoanut, sesame, and *tártago* oils; and perfumes and essences from magnificent and fragrant flowers are extracted in large quantities. There are also a few cart and carriage factories. The foreign commerce, which has quadrupled within the five years, 1874-78, is likely to further increase rapidly with the preparation of new and much-needed roads, and the extension of steam traffic on the lakes and rivers, and above all with the inauguration of an era of peace. Among exports coffee still holds the first rank, that of Maracaybo and La Guayra being in good demand in the European and American markets. The other principal articles of export are cotton, cacao, sugar, indigo, tobacco, salt, hides, cattle, tallow, horns, sarsaparilla, dye and cabinet woods, and copper ore. The exports are chiefly sent to Germany, the U. States, and France. The imports include cotton, linen, and silk goods, flour, provisions, hardware, wines, and spices; they come to the extent of nearly one fourth from Great Britain, and the remainder chiefly from the U. States, France, and Germany. The principal Caribbean ports are now visited monthly by the steamers of one American and seven European lines. A line of railroad from Tucácas to the mines of Aroá, 70 m. in length, was opened in 1877.

The results of the commercial intercourse of *V.* with the U. States for the 14 years from 1866 to 1879, are exhibited in the following statement: —

Year.	Imports from the U. States.		Exports to the U. States.	Total imports and exports.
	Domestic.	Foreign.		
	$	$	$	$
1866....	1,218,659	17,582	2,233,904	3,470,145
1867....	873,070	31,620	1,754,548	2.659,238
1868....	926,922	34,340	2,368,977	3,330,239
1869....	844,859	29,176	2,348,116	3,222,151
1870....	850,048	16,492	1,917,315	2,783.855
1871....	819,743	19,850	2,902,091	3.741,684
1872....	905,260	34,580	4,455,146	5,394,986
1873....	1.526,342	47,305	5,512,910	7,086.557
1874....	1,860,229	71,045	5,399,786	7,331,060
1875....	1,879,654	39,075	5,227,575	7,146,304
1876....	2,813,694	57,299	5.516,789	8,387,782
1877....	2,775,149	38,892	7,000,801	9,814,842
1878....	2,751,795	52,870	7,310,297	10,114,962
1879....	1,926,923	46,804	4,855,034	6,828,761
Total..	21,972,347	536,930	58,803,289	81,312,566

For the year 1879, the value of the principal articles of imports from and exports to the U. States were as follows: *Imports*, beer in bottles, $3,441; billiard tables, $3,551; breadstuffs, $658,385; candles, $21,534; carriages, $11,892; cordage, rope, etc., $36,973; cotton (manufactured), $91,831; drugs, medicines, etc., $108,530; glass and glassware, $11,838; gold coin, $73,608; machinery, etc., $96,753; edge tools, $17,-933; matches, $3,529; rosin and turpentine, $7,096; petroleum, $45,269; paints, $6,915; paper and stationery, $23,066; perfumery, $5,324; bacon and hams, $27,321; butter, $38,-599; lard, $272,714; potatoes, $10,889; sewing-machines, $21,493; sugar (refined), $29,543; tallow, $120,624; tobacco (leaf), $23,774; lumber, $27,276; household furniture, $25,654. *Exports*, barks (medicinal), $144,922; cocoa (crude), $97,-633; coffee (8,938,044 lbs.), $1,354,938; dye-woods (in sticks), $33,183; gold and silver coin and bullion, $394,683; hides and skins, $437,227; india-rubber, $23,601; chemicals, $23,-553.

Finances. — The chief source of public revenue at the disposal of the central government is that of customs duties, which produced $3,876,812 in 1878. The total revenue in the same year amounted to $6,904,716, and the expenditure to $6,714,-118. The principal branch of expenditure is for the maintenance of the army. — The public debt of *V.*, internal and foreign, was estimated at $100,000,000 at the beginning of 1879. The foreign debt, contracted chiefly in England, amounts to $33,471,756. No regular interest has been paid by the government since 1862.

The *mony, weights*, and *measures* of *V.*, and the American equivalents, are: —

Money

The *Venezolano*, or 100 *Centavas*, = about $1.00.

WEIGHTS AND MEASURES.

The *Libra*	=	1.014 pounds avoirdupois.
" *Quintal*	=	101.40 " "
" *Arroba*	=	25.35 " "

The above are the old weights and measures in general use, but the legal ones are those of the French metric system.

La Guayra, the principal seaport of *V.*, on the Carribean Sea, lat. 10° 36′ 19″ N., lon. 67° 6′ 45″ W., 5 m. N.E. of Carácas. This port has neither quay nor mole. Ships moor E. N. E. and W. S.W., with their heads to the N. at from ¼ to ¾ m. from the land, in from 9 to 18 fathoms. The holding ground is good; and notwithstanding the openness of the road, vessels properly found in anchors and cables run very little risk of being driven from their moorings. Most of the ships, however, after having discharged their cargo, go to Puerto Cabello in search of safer anchorage and for repairs. The town consists only of two streets running E. and W. on a narrow strip of land between the mountains and the sea. The climate is healthy, although the heat is excessive, ranging from 100° to 110° F. The principal commercial houses are branches of establishments in Carácas. Pop. 7,000.

Puerto Cabello, a seaport town in the State of Carabobo, on the Gulf of Triste, 70 m. W. of La Guayra. It has a spacious, deep, and safe port, with a mole and good wharves. The climate is hot and unhealthy, but, owing to its commodious port, the place is the seat of a considerable trade. Pop. 9,400.

Venice. See ITALY.

Venice White, a pigment consisting of a carbonate of lead and sulphate of baryta.

Venison, the flesh of beasts or game, or of such wild animals as are taken in the chase, particularly those of the cervine or deer kind.

Ventilator, any contrivance or apparatus for supplying fresh and removing vitiated air from buildings, mines, or other places. This may be effected either by withdrawing the foul air, and permitting the fresh air to flow in and supply its place; or by forcing in fresh air, which drives the foul air before it to the exit.

Ventouse, VENTOSE, a cupping-glass.

Vent-Pipe, an air-pipe; an escape pipe for steam.

Venture, a risk or stake; a speculation.

Venus's Hair-Stone, a variety of rock-crystal found in Brazil and Madagascar. It is used by jewellers on account of the hair-like filaments which characterize it.

Vera Cruz. See MEXICO.

Veranda, an open portico attached to a house; trellis-work round a colonnade or covered walk facing the lower windows, opening to a lawn or garden.

Veratrine, VERATRIA, a salt obtained from the white hellebore, *Veratrum alba*. It is a white or whitish-green crystalline powder, inodorous, but very acrid and poisonous. It is used in medicine for diseases connected with the nervous system. *Imp.* duty, 40 per cent.

Verbal Agreement, a contract or agreement made by word of mouth.

Verbena, one of the finest perfumes, obtained by distillation from the citron-scented leaves of *Lippia citriodora*. Owing to its high price it is successfully imitated for ordinary purposes, by mixing the essence of lemon-grass with rectified spirits, and this passes as oil of verbena.

Verd-Antique. See MARBLE.

Verdigris [Fr. *vert-de-gris;* Ger. *Grünspan*], a kind of rust of copper, of a beautiful bluish-green color, formed from the corrosion of copper by fermented vegetables. Sp. gr. 1.78. Its taste is disagreeably metallic, and, like all the compounds into which copper enters, it is poisonous. It was known to the ancients, and various ways of preparing it are described by Pliny. It is very extensively used by painters and in dyeing; it is also used to some extent in medicine. The best *V.* is made at Montpellier, France, the wines of Languedoc being particularly well suited for corroding copper, and forming this substance. It is generally exported in cakes of about 25 lbs. weight each. The goodness of *V.* is judged of from the deepness and brightness of its color, its dryness, and its forming, when rubbed on the hand with a little water or saliva, smooth paste, free from grittiness. *Imp.* free.

Verditer, a name for varieties of a blue pigment; a hydrated percarbonate of copper. It is generally prepared by decomposing the solution of nitrate of copper by the addition of chalk. There are refined blue and green verditers, known as *Bremen Blue, Bremen Green, Brunswick Green,* etc. *Imp.* duty, 30 per cent.

Verge, the spindle of a watch balance. — A rod, wand, or mace.

Veritas, a French register of shipping, like Lloyds' Register in Great Britain.

Established 6 years before Lloyds' Register, its growth has been regular and rapid, the number of vessels now inserted in its columns being little short of 20,000, and its reputation standing, even with English underwriters, as high as their own work, making it a common practice with ship-brokers of representing 3/3 as equal to A 1 justifiable. One arrangement of the *Veritas* is very useful; namely, that of indicating the nature of the voyages for which the vessel is suitable, and the character of the cargoes she is adapted to carry; thus the letter

I indicates that the vessel is adapted to interior navigation only; that is, upon rivers, lakes, canals, etc.
P, adapted to short coasting voyages.
G, adapted to long coasting voyages.
M, adapted to the Mediterranean trade.
A, adapted to the Atlantic trade; and
L, adapted to long voyages to all parts of the world.

Again, all third-class vessels are expressly stated as adapted to the carriage of such merchandise as by their nature are not subject to damage from sea water. We have, however, to complain of the want of simplicity in the classification, and would suggest that such a variety of signs might be greatly reduced. Thus we have for timber-built vessels six signs, the second, fourth, and sixth being merely refinements on those preceding.

$\left.\begin{matrix}3/3 & 11\\ 5/6 & 11\end{matrix}\right\}$ denoting two degrees of first class.

$\left.\begin{matrix}5/6 & 21\\ 3/4 & 21\end{matrix}\right\}$ denoting two degrees of second class.

$\left.\begin{matrix}2/3 & 3.2\\ 1/2 & 3.2\end{matrix}\right\}$ denoting two degrees of third class.

For iron and composite vessels similar numbers are used, namely —

$\left.\begin{matrix}1 & 3/3\ 11\\ \underset{12}{A} & 3/3\ 11\end{matrix}\right\}$ varieties of first class of equal value.

$\left.\begin{matrix}11 & 3/3\ 11\\ \underset{9}{A} & 3/3\ 11\end{matrix}\right\}$ varieties of second class of equal value.

$\left.\begin{matrix}111 & 3/3\ 11\\ \underset{6}{A} & 3/3\ 11\end{matrix}\right\}$ varieties of third class of equal value.

This number is surely unnecessary, and tends to confusion. —The term of years for which timber vessels are classed ranges from 3 to 9, continued on survey for 3 to 5. For iron and composite vessels no term is assigned, but they are subjected to periodical survey, increasing in frequency as the classes lower. No greater praise can, nevertheless, be paid to this truly great work than that indicated in the reliability of the characters given, which is the more remarkable when we consider that, however good (and they are excellent) the rules may be that are laid down for the guidance of their surveyors, they are administered by men of many countries and nationalities, in the choice of whom more than ordinary discrimination is required.

Verjuice [Fr. *verjus;* Ger. *Agrest;* It. *agresto;* Sp. *agraz*], a kind of harsh, austere vinegar, made of the expressed juice of the wild apple, or crab. The French give this name to unripe grapes, and to the sour liquor obtained from them.

Vermeil [Fr.], silver gilt, or gilt bronze.

Vermicelli, the flour of a hard, small-grained wheat, made into dough, and formed into smaller pipes or threads than macaroni, and then dried until hard. It is drawn out into slender cylinders, more or less tortuous, like worms, whence the Italian name. Macaroni is made of a less com-

pact dough than *V.* See MACARONI. *Imp.* duty, 2 cts. per lb.

Vermifuge, an anthelmintic; a medicine that expels worms.

Vermilion, the red sulphide of mercury, used as a pigment in oil and water colors. It is of a bright red color, inclining to yellow, of a good body, and of great utility in its compounds with white pigments. It was originally derived from cinnabar, but is now prepared artificially from mercury and sulphur. *V.* is subject to much adulteration in the market. Brick-dust, oxide of iron, red-lead, and dragon's blood are often employed for this purpose, producing a red, but not the beautiful red which belongs to the substance. There are tests which enable the chemists to detect these adulterations. *Imp.* duty, dry or in oil, 25 per cent.

Vermin, a collective name for all kinds of predatory animals and insects, as moles, rats, beetles, etc.

Vermont, one of the New England States of the American Union, is bounded N. by Canada; E. by New Hampshire (the Connecticut River forming the boundary); S. by Massachusetts; and W. by New York and Lake Champlain. *V.* lies between lat. 42° 44′ and 45° N., and lon. 71° 33′ and 73° 25′ W.; area, 10,212 sq. m., or 6,535,680 acres. It is divided into 14 counties, and contains 241 towns. *Montpelier*, the capital, is situated on a plain, on the Winooski or Onion River, about 200 m. N. N. W. of Boston; lat. 44° 17′ N., lon. 72° 35′ W. It is on a branch of the Central Vermont R. R., and contains two national banks and a savings bank. Pop. 3,800. Pop. of State, 350,000.

This State presents a very considerable variety of surface. It is traversed from N. to S. by the Green Mountain range, some summits of which rise to a height of 4,279 ft. above the sea. About the centre of the State they divide into two ridges, the principal of which passes in a N. N. E. direction into Canada. The Green Mountains are from 10 to 15 m. wide, much intersected by valleys abounding with spring and brooks, and are mostly covered with evergreens to their summits, from which they have derived their name. The rivers are inconsiderable; most of those flowing E. are merely small tributaries of the Connecticut; those on the W. side are larger; and the three principal, viz., Lamoille, Missisquoi, and Winooski, rise on the E. side of the principal mountain range, which they break through and enter Lake Champlain, a considerable body of water between the States of New York and *V.*, and penetrating for a few miles into Canada. It is 140 m. in length, and from 1 to 10 in breadth, lying nearly N. and S.; and contains a great number of small islands, most of which belong to *V.* The Champlain Canal, 63 m. in length, connects it with the Hudson, and large steamboats and vessels of 100 tons navigate the lake from end to end. The scenery along its shores is highly picturesque, and its waters abound in salmon, salmon-trout, sturgeon, and other fish. Lake Champlain is navigable for large vessels, and has several good harbors on the *V.* side. It is of the greatest importance to *V.* by giving her facilities for internal commerce. From the shape of the lake it gives the large amount of coast line and length of navigation, and makes up for the deficiency of navigable rivers The climate varies according to differences of level and other circumstances. It is healthy, although the winters are very severe. The soil is fertile, but more suitable for pasturage than tillage. Wool is the staple production; sheep, horses, and cattle are raised in great numbers; marble, granite, copper, and slate are abundant, and valuable quarries and mines of each are extensively worked; iron ore abounds in several localities throughout the State, and from the sulphuret of iron, in Strafford and Shrewsbury, copperas is extensively manufactured. Several mineral springs occur. — According to the last census, the total number of acres of land in farms was 4,528,804; of which 3,073,257 consisted of improved lands, 1,386,934 of woodland, and 68.613 of other unimproved soil; the cash value of farms under cultivation, $139,367,075; exclusive of $5,250,279 of implements and machinery; total value of farm products, $34,647.027; of orchard stuffs, $682,241; of market-gardens, $42,225; of lumber, etc., $1.238,929. The statistics of agricultural products for the year 1879, and the amount and value of live-stock in the same year, are given in this work under the names of each of the principal crops and animals.

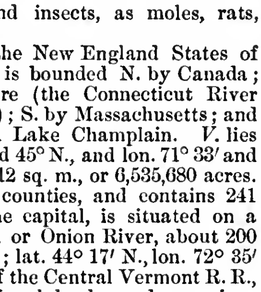

Fig. 485. — SEAL OF VERMONT.

The capital invested in manufactures at the time of the last census was $20,329,637; wages paid during the year, $6,264,-581; value of materials used, $17,007,769; of products, $32,-184,606. Besides mining and quarrying, the leading industries were the planing and sawing of lumber, employing 4,124 hands, and producing $6,069,725; tanning and currying leather, 658 hands, $2,012,513 product; flouring and grist-mill producers, 500 hands, $3,895,058 product; woollen goods, 1,892 hands, $3,550,962 product; scales and balances, 363 hands, $1,629,000 product; and machinery, 678 hands, $1,122,-567 product. — In 1879 *V.* had 47 national banks in operation, whose capital was $8,533,000; and 21 savings banks, with an aggregate capital of $344,167; deposits, $8,140,383. The total State debt in the same year was $175,000. Of the total bonds, $135,000 were held by the Agricultural College fund, and the remainder provided for. The valuation of real estate and personal property was $87,771,138; tax per capita, $0.87. — In 1879, *V.* had 873 m. of railroad, belonging to 22 corporations named in the following statement: —

Companies.	Total length of line.	Total length in Vermont.
	Miles.	Miles.
Addison	15.60	15.60
Ashuelot	24.00	0.50
Atlantic and St. Lawrence	149.50	15.00
Bennington and Rutland	63.00	63.00
Burlington and Lamoille	35.00	35.00
Central Vermont	119.00	119.00
Connecticut and Passumpsic Rivers	110.30	110.30
Grand Trunk of Canada	1,241.50	16.50
Harlem Extension	57.00	6.00
Missisquoi River	28.85	28.85
Missisquoi and Clyde	20.00	20.00
Montpelier and Wells River	38.22	38.22
Montpelier and White River	6.00	6.00
Portland and Ogdensburg	119.25	119.25
Rensselaer and Saratoga	182.62	36.63
Rutland	120.00	120.00
Southern Vermont	6.17	6.17
Vermont and Canada	65.00	65.00
Vermont and Massachusetts	80.11	10.31
Vermont Valley	24.00	24.00
West Castleton	4.10	4.10
Woodstock	14.00	14.00

V. forms a customs district, whose port of entry is —

Burlington, a fine city, the seat of *V.* University, situated in lat. 44° 27′ N., lon. 73° 10′ W., 44 m. N. W. of Montpelier. Its commerce by Lake Champlain, on a bay of which the city is built, is important, and its connections by railroad and steamboat afford it every facility in its prosecution. The harbor of Burlington is the best on the lake, and more vessels navigating the lake are owned here than at any other place. It is easy of access from the N. and S., and to protect it from the W. winds a breakwater 900 ft. long was erected. Juniper Island is distant 4 m. from the wharf, and contains 11 acres of ground. There is there a light-house, 30 ft. high, which is kept lighted at night during the season of navigation, from the middle of April to the 1st of December. The value of imports from Canada for the year 1879, was $3,074,270; of exports, $1,633,266. During that year 581 vessels of 83,744 tons entered, and 601 of 85,084 tons cleared, the port in the foreign trade. The port owned 24 vessels of 2,452 tons in aggregate. Pop. 7,000.

Vermouth, VERMUTH, an agreeable kind of tonic liqueur of the class of wine-bitters. The best is made at Turin. It was some years ago largely imported, but is now little used in this country. *Imp.* duty: spirits, as ABSINTHE; wine-bitters, as WINE.

Vernier, a movable index, used for measuring minutely the parts of the space between the equidistant divisions of a graduated scale, affixed to barometers, theodolites, and most optical instruments used in surveying.

Verona Serge, a thin worsted and cotton fabric. It is also made of mohair and cotton, and of various colors.

Verre [Fr.], glass.

Verst, Werst, a Russian itinerary measure. See Russia.

Vessel, a ship or boat. See Ship, Shipping, etc. — A cask or utensil for holding liquids.

Vest, a man's waistcoat.

Vesta, a kind of wax match.

Vestibule, a porch or entrance hall; an antichamber or lobby.

Vesting, cloth or silk material for waistcoats.

Vestry, an ante-room in a church for priests to robe in, for keeping documents, or transacting parish affairs in.

Vetch, another name for tares; a leguminous plant, the *Vicia sativa*, an extensively cultivated fodder plant in Europe.

Veterinary Surgeon, one who attends to the diseases of horses and cattle.

Vetiveyr, a name for the Khuskus grass; a scent or perfume so named. See Cuscus-Root.

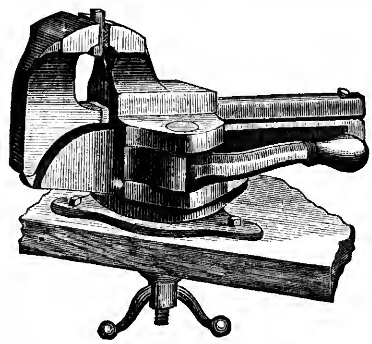

Fig. 486. — Vice.

Viaduct, an elevated erection, resting on a series of arches, for the conveyance of a road or railroad across a valley.

Vial. See Bottle.

Viands, dressed meat; food.

Vice, an iron screw-tool or holdfast, of which there are many kinds (Fig. 486), used by smiths for holding a piece of metal, while operating upon it, by placing it between two jaws or nippers, and screwing them towards each other; a machine for drawing lead into flat rods for case windows.

Vice-Men, smiths whose work is at the vice instead of the anvil.

Vichy Waters, mineral waters of Vichy, in France, much resorted to in cases of indigestion, chronic catarrh, gout, etc. The springs are the property of the French government, and the bottles, when genuine, are labelled *Proprieté et contrôle de l' Etat*. They are imported into the U. States in stone bottles. *Imp.* free.

Vicksburg. See Mississippi.

Vicksburg and Meridian R. R. runs from Vicksburg to Meridian, Miss., 140 m. This Co., located at Vicksburg, has a land grant of 404,800 acres, of which about 50,000 have been sold at an average price of $1.26 per acre. The road was completed in 1860. *Financial statement:* Cap. stock, common, $357,407, preferred (7%), $1,036,378; funded debt, $3,167,643. Per contra, cost of road and equipment, $3,179,836.

Victimize, to rob or cheat; to impose upon a person.

Victoria, a British colony in S. E. Australia, situated between lat. 34° and 39° 9′ S., lon. 141° and 150° E. It is bounded N. E. and N. by New South Wales, W. by S. Australia, and S. by the Pacific Ocean and Bass Strait, which separates it from Tasmania; area, 86,190 sq. m., or 56,446,720 acres, of which 1,420,502 were under cultivation in 1879. Its estimated population in the same year was 867,634.

Victoria is the principal gold-producing colony of Australia, to which it owes its extraordinarily rapid progression; from the discovery of gold in 1851 to 1879, the quantity raised, estimated at $20 per oz., amounted in value to $945,667,540. The value of other minerals raised during the same period, consisting principally of silver, copper, tin, and antimony, is estimated at $2,964,715. From its geographical position it enjoys a climate far more genial to Europeans than any other colony within the continent of Australia. There were 933 m. of government railroad completed in 1879, and 193 more in course of construction, the total cost of which, up to the end of 1878, amounted to $78,708,285; also 17 m. belonging to a private company, constructed at a cost to the present proprietors of $4,335,385; stage-coaches also run to all parts of the colony, except those for which railway communication is available. There were 206 stations for electric telegraphs, extending over 2,885 m., producing a revenue of $287,145 in 1879. The chief sources of income, until 1862, were the customs duties and sales of public lands; but fresh sources of revenue, derivable from the railroad system and from public works, have since been added thereto. Wool is the staple production of the colony. In 1879, the quantity exported, entered as the produce of Victoria, amounted to 74,034,057 lbs. The number of sheep in 1879 was reckoned at 10,114,267, being a larger proportion for the area than that of either of the other Australian colonies. Agriculture, formerly neglected, has within the last few years much improved, wheat and oats being the two cereals chiefly cultivated. Of the 1,420,502 acres under cultivation in 1879, about 457,535 were wheat crops, and 105,234 oats. In the same year, 457,535 gallons of wine were produced.

Melbourne, the capital of above colony, formerly Port Phillip in Australia, occupying the S. E. portion of that continent, stretching through 9° of lon., from Cape Howe on the E. to the Glenelg River on the W. The town is situated on the N. bank of the Yarra-Yarra River, about 9 m. (following its windings) from its mouth in the basin of Port Phillip, lat. 37° 49′ 5″ S., lon. 144° 58′ 35″ E. It was founded in 1837, and extends along the banks of the river. In 1851, it had a population of 23,000; and such has been the immigration consequent on the discovery of the gold fields. that, including suburbs, it had in 1867, 126,536, and in 1880 about 250,000 inhabitants. — In commerce, Melbourne ranks as the first port in the British colonies, an importance due to the gold discoveries in 1851. Besides gold, the chief exports are wool, tallow, hides, and other kinds of raw produce. The imports in 1872 amounted to $66,628,819, and the exports to $67,504,170, the latter including $25,000,000 gold and $21,000,000 wool. The principal trade is with England, and that with the U. States is not inconsiderable. The customs duties in 1872 amounted to $6,913,183. The Melbourne manufactories of mining machinery and other articles are steadily increasing. Ships drawing 24 ft. of water can come up Port Phillip as far as Hobson's Bay, at the mouth of the Yarra-Yarra; but vessels requiring more than 9 ft. cannot get over the bars. Although the distance to the bay by the course of the river is 9 m., it is not quite 2 m. by land, and a railway with an extensive jetty at its lower terminus has been made, connecting Melbourne with Port Phillip at Sandridge. There is another railway to Williamstown, on the opposite side of Hobson's Bay, which, though considerably longer, has the advantage of better shelter for ships lying at the jetty. A ship railway has been constructed here capable of taking up very large vessels. From the anchorage in Hobson's Bay to the Heads of Port Phillip the distance is about 35 m., and the channels are obstructed part of the way by sand-banks, which render the assistance of experienced pilots necessary. — The basin of Port Phillip, which receives the Yarra-Yarra and other rivers, is a large circular bay, or inlet of the sea, whence the colony derived its former name. It has a narrow entrance, not more than 1¾ m. in width, partly occupied with rocks and shoals. A light-house has been erected near the extremity of Point Lonsdale, towards the W. side of the entrance, lat. 38° 16′ S., lon. 140° 40′ E., and another on Point Gellibrand, near the head of the bay, between Williamstown and the mouth of the Yarra-Yarra River, lat. 37° 52′ S., lon. 144° 55′ E. The bay is about 40 m. broad from S. to N., and at its greatest extent is about 40 m. long from E. to W. It is said to cover an area of above 800 sq. m., and might accommodate all the navies of all the countries in the world.

Victorine, a small tippet or short tie of fur for a lady's neck.

Victual, a general name for food; provisions.

Victualler, in Scotland a corn factor; in England a publican or innkeeper. — A vessel employed in carrying provisions for other ships or vessels.

Victualling, laying in stores; taking in provisions.

Vicuna, a species of the alpaca tribe, furnishing a long, reddish wool, used for fabrics and for felting to cover hats.

Vidonia. See CANARY WINE.

Vienna. See AUSTRIA-HUNGARY.

Viertel, a variable liquid-measure: at Amsterdam, Lubec, and Hamburg, very nearly 2 gallons; at Coblentz and Cologne, not quite 1½ gallon; at Dresden, 52 gallons; as a dry measure at Bremen and in Bavaria, a little more than half a bushel. Either as a liquid or as a dry measure the term has no definite signification beyond the town or city where it is used. See also DENMARK.

View, a sketch or design; a survey or examination.

Vignette, a small woodcut or printed illustration of a page.

Vignoble, a French vineyard.

Villa, a country residence; a detached house; one surrounded by a garden or grounds.

Vin de Paille. The French wines called *vins de paille* are so denominated from the grapes being laid for several months upon straw before they are taken to the press. Sometimes, instead of being laid upon the straw, they are hung up in straw tresses. If the wine intended to be made is what is called *demi paille*, the grapes are thus exposed for 50 or 60 days only; if for *vin paille* wholly, they remain for three or four months in the foregoing state. The best *vin de paille* is made at Arbois, Jura, of the best grapes, perfectly ripe, and gathered with care. They are placed on planks, or suspended by twine, in a room where the north wind cannot enter. Three or four months after, when the fruit has lost half its bulk by desiccation, it is pressed. The must is commonly left six months in the cask fermenting. When the fermentation is complete, the wine is racked to clear it of the grosser lees. It is barrelled up, and left alone for five or six years. It is then racked again, and fined. This wine is sweet and luscious, and will keep a long time. The older it becomes, the yellower is its color. It is much sought after in France, and will bear carriage well. It has some analogy with Tokai in its qualities, getting thick by age.

Vine. See WINE.

Vinegar [Fr. *vinaigre*; Ger. *Essig*; It. *aceto*; Port. and Sp. *vinagre*], a well-known condiment, which is a weak acetic acid of different strengths, and either brown or colorless, according to the source from which it is procured. The simplest mode of obtaining *V.* is to excite a second or acetous fermentation in wine or cider; in this case oxygen is absorbed, a variable proportion of carbonic acid is generally evolved, and the alcohol of the wine passes into acetic acid. Very good *V.* is also made from strong beer, or from a wort or infusion of malt prepared for the purpose, or from a decoction of common raisins, or from a mixture of about one part of brandy with eight of water, and some sugar and yeast. The acetic fermentation is accomplished either in casks, or by allowing the alcoholic liquid to trickle slowly over shavings or twigs, a current of air passing in the opposite direction. In the U. States *V.* is usually made of cider, and when this is made from sweet apples, and is of good strength, it is equal to the best European kinds. *V.* is however still to some extent imported from Orleans, in France, where it is made on a large scale.

Imp. duty: *V.* requiring 35 grains of bicarbonate of potash to neutralize 1 oz. troy thereof, 10 cts. per gal.; concentrated, or acetous acid, see ACETIC ACID.

Vinery, a greenhouse or hot-house where vines are cultivated, and grapes ripened by artificial heat from stoves and flues.

Vineyard, an enclosure or garden where grape vines are grown.

Vingerhoed, a Dutch and Netherlandish liquid-measure, corresponding to the French centilitre = 0.0176 pint; 10,000 vingerhoeds make a vat, and 100 vingerhoeds or 10 maatjees, a Netherland kan.

Vino Greco, VINO SANTO. See ITALIAN WINES.

Vintage, the season of gathering grapes; the produce of the vine for the season; the wine produced by the crop of grapes.

Violet, a purplish-blue color, like that of the violet.

Violet-Powder, starch or flour scented with violet, used by females to powder the skin.

Violin, FIDDLE, a musical instrument, which has four gut-strings, the last or lowest covered with silver wire. The back, neck, sides, and circles, are generally made of sycamore, the belly, bass-bar, sound-post, and six blocks of deal; the finger-board and tail piece of ebony.

The construction of instruments of the *V.* class seems rather a simple matter; for there are merely a hollow body of wood, a solid wooden neck, a wooden peg or support inside the body, a certain number of catgut strings, pegs by which to screw them up, and a bridge to lift them up from the body. These pieces of wood and membrane are easily shaped and easily put together. Yet no instruments vary more in value than *V.*; and neither mechanicians nor musicians can determine precisely how or why one *V.* should turn out so much better than another exactly equal to it in appearance. The resonant quality of the wood, *i. e.*, its power of accommodating itself to various kinds of vibrations, is probably the chief element concerned in the matter; but the size and position of the holes in the body, the position of the supporting peg, and the quality of the strings, are all important points. The Amati, Guarneri, and Stradivari families made the celebrated Cremona *V.* two centuries ago, which are now valued like choice old pictures. The whole group of bowed instruments including the *violin*, *viol*, *viol de gamba*, *viola*, *viola d' amore*, *violone*, *violoncello*, *contrabasso*, etc., depend fundamentally on the same acoustic principles.

Violin-Bow, a bow strung with horse-hair for playing on a violin.

Violine. See ANILINE (VIOLET).

Violin-String, prepared gut stretched across the bridge of a violin.

Violoncello. See BASS-VIOL.

Virginia, a State of the American Union, bounded N. by West Virginia and Maryland, E. by Maryland and the Atlantic Ocean, S. by North Carolina and Tennessee, and W. by Kentucky and West Virginia. It lies between lat. 36° 31′ and 39° 27′ N., lon. 75° 13′ and 83° 37′ W.; greatest length E. to W., about 425 m.; mean length, 350 m.; extreme breadth, 280 m.; mean breadth 210 m.; area, 38,348 sq. m. *V.* is divided into 99 counties. *Richmond*, the capital, is separately noticed below. The other principal cities and towns are Alexandria (see ALEXANDRIA), Charlottesville (pop. 3,500), Fredericksburg (4,500), Lynchburg (7,500), Norfork (22,000), Petersburg (21,000), Portsmouth (12,000), Staunton (5,500), Winchester (5,000), and Williamsburg (1,600). Pop. of State, 1,500,000.

This State is separated from W. Virginia by the Shenandoah and Alleghany mountain-chains, which latter extend also through the S. W. section of the State, whose extreme limit is formed by the Cumberland Mountains, separating *V.* from Kentucky. On the E. slopes in the N. part of the State is a low outlying range, called Bull Run Mountains, separated from the Blue Ridge chain by spurs of low, heavily wooded hills, alternating with swamps and mountain torrents. The Blue Ridge, the most E. of the true Appalachian ranges, maintains throughout its course in the State a more nearly uniform elevation than either of the other ranges. W. of this chain lies the broad, beautiful, and fertile valley of the Shenandoah, with the mountain range of the same name forming its background. This range, presenting a narrow, well-defined ridge toward the

central and S. portions of its course, in the N.E. spreads out like a fan into several distinct ridges. The highest peak in *V.* is White Top in Grayson Co., 6,000 ft. above sea level. The E. part of the State, though hilly, is not mountainous, and the S. E. region is a rolling country, with extensive swamps in many localities. The Valley of Virginia, as the fertile tract watered by the Shenandoah and feeders of the James is called, lies at an elevation of from 1,200 to 1,500 ft. above the sea. The State is plentifully watered; having as its principal rivers the James, Potomac (formerly the boundary between *V.* and Maryland), Shenandoah, Rappahannock, Rapidan, York, Elizabeth, Nansemond, Nottaway, Blackwater, Pamunkey, Mattapony, and the N. and S. Anna; all discharging their waters into the Chesapeake and the Atlantic. The S. part of the State is drained by the Roanoke and its numerous affluents, and by the Blackwater and Meherrin, two arms of the Chowan; these main streams have their embouchure in Albermarle Sound, N. Carolina. The S. W. division of *V.* is intersected by the Holston and Clinch Rivers and their branches, being the head-waters of the Tennessee. The estuary of Elizabeth River, and Hampton Roads adjacent, form one of the most commodious harbors on the N. Atlantic seaboard. A long, narrow peninsula, called the *E. Shore of Virginia*, and comprising the Cos. of Accomac and Northampton, extends from lat. 38° to Cape Charles, and forms the E. point of demarkation between the lower Chesapeake Bay and the ocean. Along the seaboard of this peninsula, a series of sand-bars or spits of land, with occasional narrow sounds or i lets, extend for a considerable distance; as also does a succession of shallow reefs or islets, situated some 2 to 10 m. from the mainland, and in some places connected with it by extensive sand-drifts. The shores of that portion of Chesapeake Bay within the limits of *V.* are indented by numerous small bays, inlets, and sounds, forming excellent anchorage ground for vessels drawing little water, and abounding in shell-fish. — The climate of the E. and S.E. sections of the State is hot, with malaria in the swampy river-bottoms, producing bilious, typhoid, and intermittent fevers; the higher regions are cold in winter, but, taken as a whole, the characteristic climate of *V.* may be designated as pleasant and healthful.—The metamorphic belt, which stretches W. beyond the Blue Ridge, and widens greatly toward the S., extending so far as Carroll and Grayson Cos., on the line of N. Carolina, forms the metalliferous belt of the State, producing gold, copper, lead, and iron. Strata of the upper secondary extend in two parallel and narrow belts, following the general course of the Blue Ridge through a considerable portion of the metamorphic district; in this section lie the coal-beds of James River, which are referred to the oölite period. The specific area of the Virginian coal-field is estimated at 225 sq. m. The great valley of *V.* W. of the Blue Ridge, extending to the N. Carolinian frontier, consists chiefly of lower silurian rocks, among which the prevailing limestones insure a fertile soil. Along the mountain range next W. of the Blue Ridge occur the many and celebrated medicinal springs of Bath, Rockbridge, Montgomery, Augusta, and Rockingham Cos. In Washington and Smyth Cos., on the N. branch of the Holston River, deposits of gypsum and of salt are largely distributed, and are being extensively mined. In Hampshire Co., facing the tail end of Maryland, are the furthest outliers in *V.* to the N. E. of the great bituminous coal-field of the Middle States. Besides the mineral products already quoted, fire and porcelain clays, fine granite, slate, soapstone, sulphur, and marble are found, the variegated kinds of the latter being of remarkable beauty. — The soil of the tide-water region of *V.* presents a light sandy loam, capable, with proper care and manuring, of producing large crops of fruit and esculent vegetables; but it has been to a great extent impoverished by superficial cultivation without reinvigoration by manure, and many estates, once highly cultivated and productive, have dwindled away to mere wildernesses of scrub and small timber. These lands are, however, readily susceptible to reclamation; the free application of marl and gypsum is sufficient, in two or three years, to restore them to a condition of high productiveness. In the basins of the Potomac, York, James, and Rappahannock Rivers, great quantities of excellent tobacco are raised. The Valley of Virginia possesses a rich soil, admirably suited to the production of cereals, and is in fact the granary of the State. Much of the mountainous territory remains as yet uncultivated, some of it, indeed, being incapable of tillage; but the valleys between the parallel ridges are generally amply irrigated, and yield prolific crops if properly tilled. One of the most important crops is tobacco, the "Virginia leaf" being widely known for its excellence. In 1878, *V.* produced 86,940,000 lbs. of tobacco, being more than in any other State except Kentucky. According to the last census, the total number of acres of land in farms was 18,145,911; of which 8,165.040 consisted of improved lands, 8,294,734 of woodland, and 1,686,137 of unimproved soil; the cash value of farms under cultivation, $213,020,845, exclusive of $4,924,036 of implements and machinery; total value of farm products, $51,774,801; of orchard stuffs, $891,231; of market-gardens, $505,117; of lumber, etc., $686,862. The statistics of agricultural products for the year 1879, and the total number and value of live-stock in the same year, are given in this work under the names of the principal crops and animals.

Fig. 487. — Seal of Virginia.

The great variety and abundance of raw materials, the ample supply of water power, and the convenience and extent of transportation facilities, give to *V.* marked advantages as a manufacturing State. The total number of manufacturing establishments, as reported by the last census, was 5,933; having 396 steam-engines of 8,410 horse-power, and 2,229 water-wheels of 41,202 horse-power, and employing 26,974 hands, of whom 22,175 were males above 16 years of age, 2,259 females above 15, and 2,540 youth. The amount of capital employed was $18,455,400; wages paid during the year, $5,343,099; value of materials used, $23,832,384; of products, $38,364,322. The leading industries were: chewing and smoking tobacco, employing 7,414 hands, and producing $6,935,249; flouring and grist-mill products, 2,592 hands, $12,649,276 product; sawed lumber, 605 hands, $2,111,055 product; forged and rolled pig iron, castings, etc., 2,574 hands, $3,955,940 product; cotton goods, 1,711 hands, $1,435,800 product. The products of mines and quarries amounted to $409.914; including bituminous coal valued at $226,114; copper, $8,000; gold quartz, $31,000; iron ore, $23,000; lead, $23,000; slate, $42,800; stone, $51,000; and zinc, $5,000. The amount of capital invested in mining was $1,113,000, of which $779,200 was in the coal industry. — The canals of *V.* are the James River and Kanawha, from Richmond to Buchanan, 198 m., and North River branch to Lexington, 20 m.; the Dismal Swamp and branches, 33 m.; the Alexandria and Georgetown, 7 m.; and the Albemarle and Chesapeake, 8½ m. In 1879, *V.* had 1,645 m. of railroad, divided into 24 lines, whose total length and length in the State are shown in the following statement: —

Companies.	Total length of line.	Total length in *V.*
	Miles.	Miles.
Alexandria and Fredericksburg.........	32.40	32 40
Alexandria and Washington	6.09	6.09
Altoona Coal and Iron.................	8.50	8.50
Atlantic, Mississippi, and Ohio.........	428.00	428 00
Bright Hope...........................	21.00	21.00
Chesapeake and Ohio..................	434.60	228.68
Milton and Sutherlin..................	9.00	6.00
Petersburg	64.00	56.31
Piedmont..............................	48.60	6.00
Pittsylvania...........................	8.00	8.00
Potomac..............................	1.70	1.70
Potomac, Fredericksburg, and Piedmont	38.50	38.50
Richmond and Danville................	152.34	152.34
Richmond and Petersburg.............	24.83	24.83
Richmond, Fredericksburg, and Potomac	80.00	80.00
R. F. & P. and R. & P. Connection....	1.25	1.25
Richmond, York River, and Chesapeake	40.97	40.97
Seaboard and Roanoke.................	80.00	60.00
Strasburg and Harrisonburg	49.13	49.13
Valley.................................	25.78	25.78
Washington and Ohio..................	51.75	51.75
Washington City, Virginia Midland, and Great Southern	288.37	288.37
Winchester and Potomac	32.00	11.00
Winchester and Strasburg.............	19.00	19.00

In 1879, *V.* had 18 national banks in operation, with an aggregate capital of $3,285,000. The total State debt amounted to $29,350,828; and a law of April, 1879, provided for its refunding in 40-year non-taxable bonds, to bear interest for 10 years at the rate of 3%, for 20 years at 4%, and for the remainder of the term, 5%. The assessed valuation of taxable property was $316,686,871 (real estate, $242,702,503; personal property, $73,984,368). Tax per capita, $0.94.

V. contains 7 customs districts, having the same names as the ports of entry, except Cherrystone district, whose port of entry is Crisfield. The following table exhibits their imports and exports, and the number and tonnage of their registered, enrolled, and licensed vessels for the year 1879: —

Districts.	Imports.	Exports.	Registered, etc.	
	$	$	Vessels.	Tons.
Alexandria	11,865	13,310	98	4,359
Cherrystone............	....	....	332	5,732
Norfolk and Portsmouth	33,814	9,830,352	377	13,422
Petersburg	....	....	5	67
Richmond.............	188,459	2,932,597	49	6,733
Tappahannock	....	....	89	2,005
Yorktown..............	....	24,367	134	2,387
Total...............	234,138	12,800,626	1,084	34,705

Most of the imports brought to V. are entered at New York and other N. ports. The exports consist chiefly of tobacco, naval stores, cotton, and lumber. The following statement exhibits the relative importance of entrances and clearances for the several districts during the same year: —

Districts.	Entered.		Cleared.	
Foreign Trade.	Vessels.	Tons.	Vessels.	Tons.
Alexandria........	25	7,807	3	1,090
Norfolk and Portsmouth..........	64	64,451	112	92,599
Petersburg........	..	......	....	......
Richmond........	47	15,380	148	48,935
Total............	136	87,838	263	142,624
Coastwise Trade.				
Alexandria........	160	72,175	95	36,855
Cherrystone	....	......	....	......
Norfolk and Portsmouth..........	1,022	988,794	1,001	1,003,428
Petersburg........	388	426,432	259	344,561
Richmond.........	446	426.118	504	470,951
Tappahannock	94	65,159	1	193
Yorktown	251	199,389	104	91,018
Total...........	2,361	2,178,067	1,963	1,947,006

Norfolk, a port of entry and city, situated on the Elizabeth River, 8 m. from Hampton Roads, Chesapeake Bay, at the terminus of the Atlantic, Mississippi, and Ohio R.R., 88 m. in direct line, and 160 m. by water, S. E. of Richmond, in lat. 37° 12′ N., lon. 76° 40′ W. Its harbor is capacious and deep, easy of access, and safe in all weathers. The Roads are formed by an enlargement of James River at its mouth, in Chesapeake Bay, and they offer an anchorage unsurpassed in the world. On the opposite side of the river is Portsmouth, in connection with which it is the chief naval station of the Union. In the vicinity, at Gosport, is a U. States navy yard, containing a marine hospital, and a granite dry dock, constructed at a cost of $974,-538. More than 450,000 bales of cotton are annually received at Norfolk. Pop. 25,000.

Richmond, the capital of V., a port of entry and city situated on the N. bank of James River, at the head of tide water, and at the lower falls, about 150 m. from its mouth, and 95 m. S. S. W. of Washington, in lat. 37° 32′ 17″ N., lon. 77° 27′ 28″ W. The falls of James River afford immense water power. Vessels drawing 16 ft. can ascend to within a mile of the centre of the city, at a place called Rockets, and those of 18 ft. draught to Warwick, 3 m. below. It is expected that improvements now progressing in the river will render the docks accessible to vessels drawing 19 ft. A canal has been built round the falls, and the river is navigable above them for about 200 m. Richmond has 4 national banks, 6 State and savings banks, and 10 insurance companies. The chief articles of export are tobacco and flour. Among the manufacturing establishments, which give employment to more than 4,000 men, are 13 iron-works, machine shops, and foundries; one sugar refinery; one tannery; 4 manufactories of plug and smoking tobacco, 4 of cigars, 3 of coaches and wagons, etc. Pop. 60,000.

Virginia and Truckee R. R. runs from Reno to Virginia, Nev., 52.20 m., and branch line from Silver Junction to Silver City, 1.50 m. This Co., located at Carson City, Nev., was chartered in February, 1869, and the road opened in November of the same year. Cap. stock, $6,000,000; funded debt, $1,101,000. Per contra, cost of constructing and equipment, $4,407,658; real estate, $200,469.

Virginia Plate. See German Silver.

Virtu, objects of art or antiquity considered collectively.

Virtuoso, one skilled in antique or natural curiosities.

Vis-a-vis, a dress carriage for town use.

Viscous, clammy or tenacious.

Visit, the attendance of a surgeon or physician, inspector, etc.

Visite, a lady's mantle worn over the shoulders.

Visiting-Card, a name-card; an address-card.

Vitela [Sp.], calf-skin leather; vellum.

Vitelotte [Fr.], a kind of long red potato.

Vitre [Fr.], a pane of glass.

Vitreous, resembling glass.

Vitriol, a name still retained in manufactures and commerce, although scientific chemists have discarded it. *Green V.* or *Copperas* is the sulphate of iron; *blue V.* is the sulphate of copper; and *white V.* is the sulphate of zinc. Sometimes the name of *red V.* is given to the sulphate of cobalt. V., when pure, occurs in beautiful crystals. It is extensively used in dyeing, ink-making, the manufacture of colors, and in medicine. *Oil of V.* has changed its name to sulphuric acid. *Imp.* duty: Green V., ½ ct. per lb.; blue V., 4 cts. per lb.; white, 20 per cent.

Vittie-Vayr, another Indian name for the cuscus grass, *Andropogon muricatus.*

Vivarium, a pond or tank, etc., for keeping fish in.

Vivianite, a blue phosphate of iron, occasionally used as a pigment.

Voile [Fr.], a sail.

Voiture [Fr.], a carriage or conveyance.

Volatile Alkali. See Ammonia.

Volatile Oils. See Oils (Volatile).

Volige [Fr.], a thin plank of white wood.

Volnay. See Burgundy Wines.

Volume, a chemical expression for a portion or part. — A body of gas. — A roll or book.

Vomit-Nut. See Nux-Vomica.

Vosnes. See Burgundy Wines.

Voucher, an instrument or document produced to substantiate a statement of account or disbursements, or of goods and other commodities received.

Voussoirs, a name for the ring stones, or those forming an arch.

Voyage, a passage taken by sea.

Vulcanite, Ebonite. When the proportion of sulphur mixed with india-rubber (see India-Rubber) is increased to 25 or 35 per cent, another product having qualities entirely different from those of vulcanized india-rubber is obtained when the mixture is heated. This is the jet-black substance termed *ebonite* or *vulcanite*, which is made into such articles as combs, paper-knives, buttons, canes, portions of ornamental furniture, and plates of electrical machines. It is in many cases an excellent substitute for horn and for whalebone, while for insulating supports, etc., in electric apparatus, it is unrivalled. It has a full black color and takes a bright polish; and it may be cut, or filed, or moulded. It is very tough, hard, and durable. In the transformation of india-rubber into vulcanite, the temperature must be somewhat higher than that required for the production of the vulcanized india-rubber. The india-rubber used is very carefully purified before it is incorporated with the sulphur: and the yellow paste formed by the mixture is subjected to the contact of steam at a temperature of about 310°.

Vulcanized Indian-Rubber. See India-Rubber.

Vulnerary, any application useful in the cure of wounds.

W

Wabash Railway. See this head in the Appendix.

Wabash River. See INDIANA.

Wad, old rope or rounding for covering the charge and shot in a cannon; paper, card-board, etc., used to ram down the charge of a fowling-piece, etc. *Imp.* duty, 35 per cent. — A name for graphite in some parts of England.

Wadding [Fr. *ouate;* Ger. *Watte;* It. *bambaglia;* Sp. *huata*], a soft, loosely woven stuff used by tailors; a soft spongy web, made with a fleece of cotton prepared by the carding machine, and applied to tissue paper by a coat of size; used for interlining garments, window-curtains, etc.

Wadmal, a coarse, hairy woollen fabric.

Wadset, a mortgage of goods.

Wafer, a thin, round leaf of backed paste formerly used for sealing letters, and now for making official impressions on, at the foot of documents. They are made of flour, isinglass, yeast, and white of eggs, dried in thin layers upon tin plates, and cut out by a circular instrument; they are colored by red-lead, etc. *Imp.* free.

Waffle-Iron, a griddle for baking thin hard cakes called waffles.

Wager, a bet; one who lays on chance.

At law, wager is a contract by which two parties or more agree that a certain sum of money, or other thing, shall be paid or delivered to one of them, on the occurrence or non-occurrence of a certain event. Wagers were valid contracts at common law, and the amount won could be recovered in a court of law, unless the wager operated as an incitement to breach of the peace or of morality, or was *contra bonos mores*, or affected the feelings or interests of a third party, or disturbed the peace of society. In this country, the law and decisions of courts in matters of wagers in the several States are much at variance. It is doubtful, however, whether an action by a winner of a mere wager or bet against a loser would be now sustained in any court.

Wages, that which is covenanted to be paid for work done; hire; reward; that which is paid or stipulated for services; price paid for labor; the return made or compensation paid to those engaged to perform any kind of labor or service by their employers; recompense; fruit; that which is given in return. The term is commonly applied to the payment of manual or mechanical labor, other than that performed by the more educated classes, to which the word *salary* bears reference.

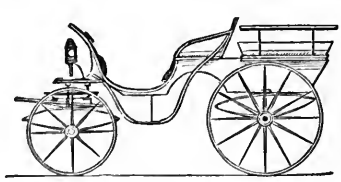

Fig. 488. — WAGONETTE.

Wagon, WAGGON, a four-wheeled vehicle, usually drawn by horses, — especially one used for the carriage of freight or heavy goods or substances. — In England, a freight-car on a line of railroad.

Wagoner, the driver of a wagon.

Wagonette, a carriage (Fig. 488) to carry 6 or 8 persons.

Waif, a stray; an article picked up at sea; anything left without an owner.

Wain, another name for a wagon.

Wainscot, WAINSCOTING, a name given to boards serving to line the internal walls of an apartment, staircase, etc. *W.* is usually made in panels, to serve instead of hangings, wall-paper, etc.

Wair, a plank 6 feet long by 1 foot broad.

Waist, the part of the upper deck of a ship between the fore and main masts.

Waistband, a lady's sash; the band of the trousers above the waist.

Waist-Belt, a child's or man's leather belt.

Waistcoat, a man's sleeveless vest; an under-garment worn within the coat.

Waistcoatings, a kind of fancy fabric made of worsted, worsted and cotton, or worsted and silk, in which there is a pattern of some kind or other, worked by the loom; different-colored yarns being employed.

Waiter, a table attendant at an hotel or restaurant. — A salver or tray.

Waiting-Maid, a lady's toilet assistant.

Wales. See GREAT BRITAIN (ENGLAND).

Wales, the strong side-planks of the body of a ship, running fore and aft.

Walk, the district served by any vendor. — That portion of the ambulatory of the Royal Exchange, London, which is specially frequented by merchants or traders to some particular country.

Walking-Stick, a staff or cane to walk with; of these there are numerous kinds, as Malacca-canes, Penang-lawyers, Whanghees, Supple-Jacks, and other fancy varieties. *Imp.* duty: finished or not, 35 per cent.

Wall, a brick or stone erection for a fence; the side of a building or room. — A sailor's term for a large knot put at the end of a rope. — A German name for fourscore, or eighty pieces.

Waller, a mason. — A term applied in England to men loading flats, a description of river-boat or barge.

Wallet, a travelling-bag; a pedlar's bundle.

Wall-Fruit, grapes, stone-fruit, etc., grown on trees trained along walls.

Wall-Paper. See PAPER-HANGINGS.

Wall-Plates, timber resting on side-walls to support girders, etc.

Wall-Rock, a name for granular limestone.

Walnut [Fr. *noix;* Ger. *Wallnüss;* It. *noce;* Sp. *nuece*], the fruit or nut of the *Juglans*, or walnut-tree, of which there are several varieties. The walnut of Europe (*J. regia*) is a large, handsome tree, with strong, spreading branches. The fruit is a pretty large, smooth, ovate nut, containing an oily kernel divided into four lobes. The nut has been always held in high estimation; it was called by the Romans *Jovis glans*, the acorn or mast of Jove, and hence the name of the tree. Previously to the very general introduction of mahogany, the wood of the walnut-tree was generally, and is yet extensively, used in making of furniture. It is much used by turners, and is superior to every other sort of wood for the mounting of guns. The nuts are either gathered when ripe, being served up at desserts without any preparation, or they are plucked green and pickled. They are also pressed for their oil, which is used for food, as a substitute for olive-oil; also as a painter's oil, and for the finest kinds of printer's ink. The nuts are to a certain extent imported into this country as a dessert fruit, chiefly from France. *Imp.* duty, 3 cts. per lb.

The black walnut of the U. States (*J. nigra*) is found from New England to Florida, but is chiefly abundant W. of the Alleghanies. It is a large, quick-growing tree, and when in a forest has a clear trunk 30 to 50 ft. without a branch, but in open ground it branches low, and forms a wide-spreading head. The fruit, which is edible and sold by the bushel, is spherical, the surface marked by rough dots, greenish-yellow when ripe, but soon turning black; the round, slightly flattened nut has a deeply corrugated, hard shell, with an oily kernel, which soon becomes rancid. The wood is hard, fine-grained, and durable, and takes a fine finish. When first cut it is purplish-brown, but with age it turns very dark, even almost black. The husks of the fruit are used in dyeing. On account of its rapid growth and the value of its timber, this is largely planted in the treeless portions of the W. States. See BUTTERNUT.

Walrus, a name for the morse, or sea-horse, the *Trichechus rosmarus*, sought after in northern latitudes for the oil obtained from its blubber, and for its teeth, which furnish the most dense ivory for dental purposes.

Wantage, the difference between the actual contents found, and the capacity of a cask of liquids; ullage.

Wanty, a leather girdle.

Ward, a curved ridge of metal inside a lock which opposes an obstacle to the passage of a key which is not correspondingly notched.

Ward-Burton Rifle. See GUN.

Warden, a custodian or guardian; a head officer in some companies, colleges, etc.

Wardrobe, a collection of wearing-apparel; a detached piece of furniture for keeping the same in.

Ware, any salable merchandise, as hardware, tinware, earthenware, smallwares, etc.

Warehouse [Fr. *entrepôt;* Ger. *Waarenlager;* It. *magazzino;* Sp. *almacen*], a storehouse for wares or goods; a magazine; a depot.

Warehouseman, a person who receives goods and merchandise to be stored in his warehouse for hire.

A *W.* is bound to use ordinary care in preserving goods and merchandise stored in his warehouse, and his neglect to do so will render him liable to the owner. The *W.*'s liability commences so soon as the goods arrive, and the crane of the warehouse is applied to raise them into the warehouse.

Warehousing or BONDING SYSTEM, a system under which certain warehouses are appointed, under the charge of officers of the customs, in which goods may be deposited without being chargeable with duty until they are cleared for consumption. This system affords the most liberal convenience to the merchant, and a general facility to the trade of a country. The tax on a commodity is paid just when it is wanted, and when it is therefore least inconvenient to pay it. Suppose, for example, that a merchant imports goods, and is required to pay a duty upon them immediately, and before he has found a market for them; he must either pay the tax and hold the goods, in which case the consumer will have to repay not only the tax but the interest on it; or he must sell the goods, and if he parts with them at a loss or inconvenience, trade is injured, and the general wealth and consequent productiveness of taxation proportionally diminished. Besides, the necessity of having to pay duties immediately on importation is a bar to the entrepôt and carrying trade of a country. The warehousing system of the U. States was established by two acts of Congress which are here given in full·—

Act of August 6, 1846 (*called the Warehousing Act*).

Sect. 1. Be it enacted, That on and after the day this act goes into operation the duties on all imported goods, wares, or merchandise shall be paid in cash: *Provided*, That, in all cases of failure or neglect to pay the duties within the period allowed by law to the importer to make entry thereof, or whenever the owner, importer, or consignee shall make entry for warehousing the same in writing, in such form and supported by such proof as shall be prescribed by the Secretary of the Treasury, the said goods, wares, or merchandise shall be taken possession of by the collector, and deposited in the public stores, or in other stores to be agreed on by the collector or chief revenue officer of the port and the importer, owner, or consignee, the said stores to be secured in the manner provided for by the first section of the act of April 20, 1818, entitled "An Act providing for the deposit of wine and distilled spirits in public warehouses, and for other purposes," there to be kept with due and reasonable care, at the charge and risk of the owner, importer, consignee, or agent, and subject at all times to their order upon payment of the proper duties and expenses, to be ascertained on due entry thereof for warehousing, and to be secured by bond of the owner, importer, or consignee, with surety or sureties, to the satisfaction of the collector, in double the amount of the said duties, and in such form as the Secretary of the Treasury shall prescribe: *Provided*, That no merchandise shall be withdrawn from any warehouse in which it may be deposited, in a less quantity than in an entire package, bale, cask, or box, unless in bulk; nor shall merchandise so imported in bulk be delivered, except in the whole quantity of each parcel, or in quantity not less than one ton weight, unless by special authority of the Secretary of the Treasury. And in case the owner, importer, consignee, or agent of any goods on which the duties have not been paid, shall give to the collector satisfactory security that the said goods shall be landed out of the jurisdiction of the U. States, in the manner now required by existing laws relating to exportations for the benefit of drawback, the collector and naval officer, if any, on an entry to re-export the same, shall, upon payment of the appropriate expenses, permit the said goods, under the inspection of the proper officers, to be shipped without the payment of any duties thereon. And in case any goods, wares, or merchandise, deposited as aforesaid, shall remain in public store beyond one year, without payment of the duties and charges thereon, then said goods, wares, or merchandise shall be appraised by the appraisers of the U. States, if there be any at such port, and if none, then by two merchants to be designated and sworn by the collector for that purpose, and sold by the collector at public auction, on due public notice thereof being first given, in the manner and for the time to be prescribed by a general regulation of the Treasury Department; and at said public sale distinct printed catalogues, descriptive of said goods, with the appraised value affixed thereto, shall be distributed among the persons present at said sale; and a reasonable opportunity shall be given before such sale, to persons desirous of purchasing, to inspect the quality of such goods; and the proceeds of said sale, after deducting the usual rate of storage at the port in question, with all other charges and expenses, including duties, shall be paid over to the owner, importer, consignee, or agent, and proper receipts taken for the same: *Provided*, That the overplus, if any there be, of the proceeds of such sales, after the payment of storage, charges, expenses, and duties as aforesaid, remaining unclaimed for the space of ten days after such sales, shall be paid by the collector into the treasury of the U. States; and the said collector shall transmit to the Treasury Department, with the said overplus, a copy of the inventory, appraisement, and account of sales, specifying the marks, numbers, and description of the packages sold, their contents and appraised value, the name of the vessel and master in which, and of the port or place whence they were imported, and the time when and the name of the person or persons to whom said goods were consigned in the manifest, and the duties and charges to which the several consignments were respectively subject; and the receipt or certificate of the collector shall exonerate the master or person having charge or command of any ship or vessel in which said goods, wares, or merchandise were imported, from all claim of the owner or owners thereof, who shall, nevertheless, on due proof of their interest, be entitled to receive from the treasury the amount of any overplus paid into the same under the provisions of this act.

Sect. 2. Any goods when deposited in the public stores in the manner provided for in the foregoing section, may be withdrawn therefrom and transported to any other port of entry, under the restriction provided for in the act of March 2, 1799, in respect to the transportation of goods, wares, and merchandise from one collection district to another, to be exported with the benefit of drawback; and the owner of such goods so to be withdrawn for transportation shall give his bond with sufficient sureties, in double the amount of the duties chargeable on them, for the deposit of such goods in store in the port of entry to which they shall be destined, such bond to be cancelled when the goods shall be re-deposited in store in the collection district to which they shall be transported: *Provided*, That nothing contained in this section shall be construed to extend the time during which goods may be kept in store,

after their original importation and entry, beyond the term of one year.

Sect. 3. If any warehoused goods shall be fraudulently concealed or removed from any public or private warehouse, the same shall be forfeited to the U. States; and all persons convicted of fraudulently concealing or removing such goods, or of aiding or abetting such concealment or removal, shall be liable to the same penalties which are now imposed for the fraudulent introduction of goods into the U. States; and if any importer or proprietor of any warehoused goods, or any person in his employ, shall by any contrivance fraudulently open the warehouse, or shall gain access to the goods, except in the presence of the proper officer of the customs acting in the execution of his duty, such importer or proprietor shall forfeit and pay for every such offence one thousand dollars. And any person convicted of altering, defacing, or obliterating any mark or marks which have been placed by any officer of the revenue on any package or packages of warehoused goods, shall forfeit and pay for every such offence five hundred dollars.

Act of March 28, 1854.

Sect. 1. From and after the passage of this act, any goods, wares, or merchandise subject to duty, with the exception of perishable articles, also gunpowder, fire-crackers, and other explosive substances, which shall have been duly entered and bonded for warehousing, in conformity with existing laws, may be deposited at the option of the owner, importer, consignee, or agent, at his expense and risk, in any public warehouse owned or leased by the U. States, or in the private warehouse of the importer, the same being used exclusively for the storage of warehoused goods of his own importation or to his consignment, or in a private warehouse used by the owner, occupant, or lessee, as a general warehouse for the storage of warehoused goods, such place of storage to be designated on the warehouse entry at the time of entering such merchandise at the custom-house: *Provided*, That such private warehouse shall be used solely for the purpose of storing warehoused goods, and shall have been previously approved by the Secretary of the Treasury, and have been placed in charge of a proper officer of the customs, who, together with the owner and proprietor of the warehouse, shall have the joint custody of all the merchandise stored in said warehouse, and all the labor on the goods so stored must be performed by the owner or proprietor of the warehouse, under the supervision of the officer of the customs in charge of the same, at the expense of the aforesaid owner or proprietor: *And provided further*, That cellars and vaults of stores for the storage of wines and distilled spirits only, and yards for the storage of coal, mahogany, and other woods and lumber, may, at the discretion of the Secretary of the Treasury, be constituted bonded warehouses for the storage of such articles, under the same regulations and conditions as required in the storage of other merchandise; the cellars or vaults aforesaid shall be exclusively appropriated to the storage of wines or distilled spirits, and shall have no opening or entrance except the one from the street, on which separate and different locks of the custom-house and the owner or proprietor of the cellars or vaults shall be placed.

Sect. 2. Unclaimed goods, wares, or merchandise required by existing laws to be taken possession of by collectors of the customs, may be stored in any public warehouse owned or leased by the U. States, or in any private bonded warehouse authorized by this act, and all charges for storage, labor, and other expenses accruing on any such goods, wares, or merchandise, not to exceed in any case the regular rates for such objects at the port in question, must be paid before delivery of the goods on due entry thereof by the claimant or owner; or, if sold as unclaimed goods to realize the import duties, the aforesaid charges shall be paid by the collector out of the proceeds of the sale thereof, before paying such proceeds into the Treasury, as required by existing laws. And any collector of the customs is hereby authorized, under such directions and regulations as may be prescribed by the Secretary of the Treasury, to sell upon due notice, at public auction, any unclaimed goods, wares, or merchandise deposited in public warehouse, whenever the same may, from depreciation in value, damage, leakage, or other cause, in the opinion of such collector, be likely to prove insufficient on a sale thereof to pay the duties, storage, and other charges if suffered to remain in public store for the period now allowed by law in the case of unclaimed goods.

Sect. 3. Before any of the stores or cellars aforesaid, owned or occupied by private individuals, shall be used as a warehouse for merchandise imported by other merchants or importers, the owner, occupant, or lessee thereof shall enter into bond, in such sums and with such sureties as may be approved by the Secretary of the Treasury, exonerating and holding the U. States and its officers harmless from or on account of any risk, loss, or expense of any kind or description, connected with or arising from the deposit or keeping of the merchandise in the warehouse aforesaid; and all imports deposited in any public or private warehouse authorized by this act, shall be at the sole and exclusive risk and expense of the owner or importer.

Sect. 4. All goods, wares, and merchandise which may be hereafter duly entered for warehousing under bond, and likewise all merchandise now remaining in warehouse under bond, may continue in warehouse, without payment of duties thereupon, for a period of three years from the date of original importation, and may be withdrawn for consumption on due entry and payment of the duties and charges, or upon entry for exportation, without the payment of duties at any time within the period aforesaid; in the latter case, the goods to be subject only to the payment of such storage and charges as may be due thereon: *Provided, however*, That where the duties shall have been paid upon any goods, wares, or merchandise entered for consumption, said duties shall not be refunded on exportation of any such goods, wares, or merchandise, without the limits of the U. States: *And provided further*, That there shall be no abatement of the duties or allowance made for any injury, damage, deterioration, loss, or leakage sustained by any goods, wares, or merchandise, whilst deposited in any public or private bonded warehouse established or recognized, by this act.

Sect. 5. Any goods, wares, or merchandise, duly entered for warehousing, may be withdrawn under bond, without payment of the duties, from a bonded warehouse in any collection district of the U. States, and be transported to a bonded warehouse in any other collection district within the same, and re-warehoused thereat; and any such goods, wares, or merchandise may be so transported to their destination wholly by land, or wholly by water, or partly by land and partly by water, over such routes as the Secretary of the Treasury may prescribe, and may likewise be conveyed over any foreign Territory, the government of which may have, or shall by treaty stipulations grant, a free right of way over such territory; and for the purpose of better guarding against frauds upon the revenue on foreign goods transported between the ports of the Atlantic and those of the Pacific overland through any foreign territory, the Secretary of the Treasury be, and is hereby authorized to appoint special sworn agents as inspectors of the customs, to reside in said foreign territory where such goods may be landed or embarked, with power to superintend the landing or shipping of all goods passing coastwise between the ports of the U. States on the Pacific and Atlantic, and whose duty it shall be, under such regulations and instructions as the Secretary of the Treasury may prescribe, to guard against the perpetration of any frauds upon the revenue: *Provided*, That the compensation paid to said inspectors shall not in the aggregate exceed five thousand dollars per annum.

Sect. 6. The Secretary of the Treasury shall prescribe the form of the bond to be given for the transportation of goods, wares, and merchandise, from a port in one collection district to a port in another collection district in the U. States, as provided in the preceding section; also the time for such delivery; and for a failure to transport and deliver, within the time limited, any such bonded goods, wares, and merchandise, to the collector at the designated port, an additional duty of one hundred per cent shall be levied and collected, which additional duty shall be secured by such bond, or said goods, wares, and merchandise may be seized and forfeited for such failure, and any steam or other vessel, or vehicle transporting such bonded goods, wares, and merchandise, the master, owner, or conductor of which shall fail to deliver the same to the collector at the designated port, shall be liable to seizure and forfeiture.

Warp, in weaving, the *longitudinal* threads of a woven fabric; they are crossed by the *transverse* threads, or *woof*. — *Warp*, a rope or hawser employed occasionally to remove a ship from one place to another in a port, road, or river. Hence *to warp* is to change the position of a ship by pulling her from one part of a harbor, etc., to some other, by means of warps, which are attached to buoys, to other ships, to anchors sunk in the bottom, or to certain stations upon the shore, as posts, rings, trees, etc.

Warrant, an authority or commission of any kind from a magistrate, or superior executive officer or body.

Warranty [Fr. and Ger. *Garantie;* It. *garanzia;* Sp. *fianza garantia*], a guarantee given of the character or soundness of merchandise or goods sold, or of a horse.

As regards things personal, it is the general rule that a purchaser of goods and chattels may have a satisfaction from the seller, if he sells them as his own and the title proves deficient, without any express *W.* for that purpose; but that with regard to the goodness of the things so purchased, the vendor is not bound to answer, unless he has expressly warranted them to be good, or unless he has in any way misrepresented them; but a *W.* is implied in certain cases by the custom of trade or the nature of the contract.

In the contract of *Marine Insurance*, *W.* is an engagement on the part of the insured, that a certain thing has happened, or is to happen. It is part of the consideration for which the underwriter accepts the engagement; it is therefore an absolute condition, and if it do not occur as specified, the insur-

ance is void, whether the circumstance be owing to the conduct of the insured or not, and whether it affect the risk or not. *W.* and mere representation differ from each other in this, that the former must absolutely agree with the event to the most minute particular, while the latter only requires to agree in substance, and does not affect the contract, unless through fraud or negligence it shall have increased the actual risk. It is divided into express and implied, the latter being merely used to express the conditions on the part of the insured necessarily arising from the nature of the contract; as, that the ship shall be seaworthy, navigated with skill and care, that the voyage is lawful, and shall be performed without wilful deviation, etc. The most important and ordinary *W.* during peace is generally as to the time of sailing. Where a ship is warranted "*to sail*" on a particular day, she must be really on her voyage, having made every preparation, by having taken in her whole cargo, cleared at the custom-house, etc.; and if so prepared for her voyage, and having set sail, she be afterwards detained in some port of the same territory, as by an embargo, or to form convoy, it will be held as compliance; but not so if the preparations for commencing the voyage have not been completed, or if, having been completed, the vessel is prevented from breaking ground by stress of weather or otherwise. As to the question, what shall amount to a *sailing*, to satisfy the *W.*, there can be no doubt that, where a ship once breaks ground, and is fairly under sail *upon her voyage*, though she go ever so little a way, and afterwards put back from stress of weather, or apprehension of an enemy in sight; or if she be then put under an embargo, and detained beyond the time of sailing, — this is still a *beginning* to sail, and the interruption does not alter the case, because the *W.* is already complied with. There is a distinction between a *W.* to sail, as above, and a *W.* to *depart*, the latter being held to import that the vessel is finally out of port. All express *W.* must appear on the face of the policy. It does not require, however, to appear in the body of the policy, — a note on the margin suffices.

Wash, in distilling, the fermentable liquor produced by dissolving the proper subjects for fermentation and distillation in common water. — That with which anything is wetted, washed, coated, etc., upon the surface; as, (1.) A color spread or floated thinly over broad masses or spaces of a picture to make it appear the more natural. (2.) A thin coat of metal, or other substance, laid on boards or other work for beauty or preservation. (3.) A cosmetic for the complexion; as, a face-*wash*; also, a preparation for improving the hair; as, a hair-*wash*. (4.) A lotion; a medical preparation in a liquid form, to be applied externally; as, a black *wash*.

Wash-Ball, a ball of soap used in ablutions.

Wash-Board, a board with a ribbed or fluted surface, on which linen, etc., is rubbed in course of being washed.

Washed, covered with a thin coat of silver or gold, tinted or coated on the surface.

Washer, in machinery, an annular disk of metal or wood, which slips over a bolt, and upon which the nut is screwed fast. — A domestic apparatus for cleansing.

Washing, in Stock Exchange parlance, the name given to an operation performed by a clique of speculators, to the following effect. A stock is on the list, but no demand for it exists; so, to induce the public to buy it, several brokers are commissioned to "wash" the dormant stock, and they set about it in this manner: A. offers to sell. B. takes what is offered. C. wants to buy. D. sells C. all he wants. This, kept up for some days, causes the price to rise steadily, although not one share of the stock is actually sold. But the outsider, believing these fictitious transactions to be real, goes in as a buyer himself, thinking to make a lucky "hit" in the stock. He seldom, however, gets as much for the stock as he paid, for it drops in value again as soon as the "washing" business is over.

Washing-Machine. The washing or rinsing of woven goods, in the large operations of bleaching and dyeing, is very generally done with *dash-wheels.* The cloth is put into a case or hollow drum, capable of rotating on a horizontal axis; there are perforations in the exterior edge of the drum, and there is also an outer case which does not rotate. Wet cloth is put into the drum, and the drum rotated with great velocity; the moisture, whirled out of the cloth by centrifugal force, escapes through the perforations into the outer case, whence it flows away through a pipe. Sometimes pressure between rollers is used, instead of centrifugal force. In the washing-machines made for domestic use, both of these methods are adopted, as well as others. In the rotating machines soap and alkali are put with the water into the drum. In one form, several wooden balls are whirled about among the wet linen, which they help to cleanse by their friction. In another, the linen is twisted into a kind of roll, and squeezed between rollers in a way somewhat imitative of the process of wringing. In a third, portions of the apparatus vibrate in a manner bearing an analogy to the rubbing action of the wrists and knuckles of a laundress. Many of the machines have rollers of india-rubber, between which the linen passes after washing, to effect the process of wringing.

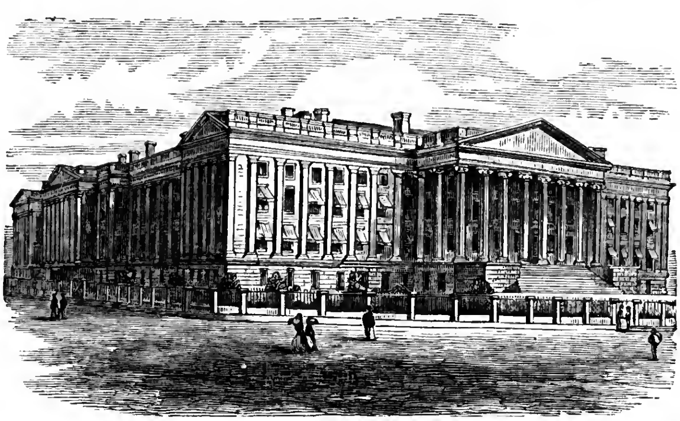

Fig. 489. — Treasury Department (Washington).

Washington, the capital of the U. States, in the Federal District of Columbia, on the left bank of the Potomac, and 160 m. from its mouth, between the Anacosta or Eastern branch and Rock Creek, which separates it from Georgetown, 39 m. S. W. of Baltimore, 136 m. from Philadelphia, 224 m. from New York, 432 m. from Boston, 497 m. W. from Cincinnati, 700 m. from Chicago, 856 m. N. from St. Louis, 2,000 m. from San Francisco, and 1,033 m. N. from New Orleans; lat. (taken from the Capitol) 38° 52′ 20″N., lon. 77° 0′ 15″ W. The natural situation of Washington is pleasant and salubrious, and it is laid out on a plan which renders it one of the handsomest and most commodious cities in the world. The prosperity of

Washington depends upon the presence of the national government. Its retail trade is considerable, but there is very little manufacturing or other business. Pop. 150,000.

Washington, a territory of the American Union, and, with the exception of Alaska, the most extreme N. W. section of the U. States, is bounded N. by British Columbia, E. by Idaho, S. by Oregon, and W. by the Pacific Ocean. It lies between lat. 49° 30′ and 49° N., lon. 117° and 125° W.; maximum length E. to W., 345 m., maximum breadth, 230 m.; area, 69,994 sq. m., or 44,769,100 acres. It is divided into 24 counties. *Olympia*, the capital (pop. 2,000), is situated at the head of Budd's Inlet, the S. projection of Puget Sound, 625 m. N. of San Francisco, and 95 m. N. by W. of Portland, Oregon, in lat. 47° 3′ N., lon. 122° 57′ W. Pop. of the Territory, 40,000.

The coast line of *W.* extends a distance of about 250 m. In the N. the Territory is separated from Vancouver's Island by the Strait of Juan de Fuca, which connects with the Pacific Ocean by a deep bay extending S. from 60 to 70 m., called Admiralty Inlet. The continuous chain of mountains known as the Sierra Nevada in California, takes the name of the Cascades, or Cascade Range, in the regions immediately N. of that State, and traverses this territory, varying but little from a N. and S. course, at an average distance from the coast of 100 m. This range, as in Oregon, separates the Territory into two unequal divisions, the E. and W., differing from each other in climate, soil, geological character, and natural productions. That section of the Territory E. of the Cascades is not very equally divided by the Columbia River, thus constituting three natural divisions: Western *W.*, termed the *Puget Sound Country;* Central *W.*, or Yakama Valley; and Eastern *W.*, sometimes termed the *Upper Country*, and sometimes the *Walla-Walla Valley*, and *Spokane Plains*. The division W. of the Cascade Range embraces Puget Sound Basin, the valley of the Chehalis, the basin of Shoal Water Bay, and the region drained by the Lower Columbia and its N. tributaries. Puget Sound, though properly the smallest subdivision, is the name given to that vast ramification of waters known variously as the Strait of Juan de Fuca, Admiralty Inlet, Hood's Canal, and Puget Sound, together with almost innumerable bays, inlets, and harbors, each having a separate name. These waters, extending from lat. 47° to 49° N., cover an area of 1,500 sq. m., with a total shore line of 1,594 m. The Columbia River, traversing the whole breadth of the Territory from N. to S., and there forming a large part of its S. boundary, constitutes a main artery for travel and transportation of merchandise and produce from the great interior to the Pacific, and in the present incomplete condition of roads, via the Cascade Range, affords the channel of communication between the tracts separated by that mountain chain. The principal affluents of this noble stream are Lewis Fork and Clarke and Spokane Rivers. — The soil in the valleys is very generally fertile; while between the Cascades and the E. limit of the Territory, the plain of the Columbia presents a sterile, barren region, nearly destitute of wood and water. The valleys of the Puyallup and Stock Rivers, emptying into Puget Sound, afford a large quantity of good tillable land. The soil in the river bottoms is thinly timbered with maple, ash, elm, balm, and willow. These lands yield heavy crops of cereals, while vegetables reach an enormous size. The highlands are generally of a rolling character, and well adapted to cultivation. Through the valleys of Yakama and Nachess, a military road passes from Fort Walla-Walla, across the Cascade Range, to Steilacoom. An extensive and rich agricultural region is thus opened out in all of these valleys, and is being rapidly filled up with enterprising settlers, the greater portion of this section having been surveyed. In the valley of the Skokomish River, which takes its rise in the Coast Range and empties into Hood's Canal some 30 m. N. E. of Olympia, the soil is equal to the best bottom land in the W. States. The average yield of potatoes to the acre is 600 bushels, wheat 40, pease 60, timothy grass 5 tons, and oats 70 bushels. The Chehalis River, rising in the Cascades not far N. of the Columbia, and navigable for light-draught steamers a distance of 60 m. from Gray's Harbor, into which it falls, borders a valley which is the richest and most extensive body of tillable land in the W. section, and well deserves the title accorded to it, — that of the *garden of W. T.* This valley varies in breadth from 15 to 50 m. In the section W of the Cascade Range, crops of wheat, barley, and oats, are equal to those of any other part of the continent. In fruits, the apple, pear, cherry, and plum are abundant, and of excellent quality. The coolness of the nights is unfavorable to the maturing of Indian-corn, peaches, and grapes, yet in well-sheltered nooks in the valleys these are successfully cultivated. In the central portion of the Territory, situated between the Cascades and the Columbia River, with the exception of certain valleys, the soil is generally thin, sterile, stony, and dry. The Colville Valley, in the N. E. portion of the Territory, has large quantities of land surveyed, and numerous thriving settlements have already become established there. The forests from the Cascade Range to the Pacific form a dense mass of some of the finest timber growths in the world, affording many examples of trees 400 ft. high, and 14 ft. in diameter near the ground. The principal varieties are several kinds of fir, interspersed with spruce, hemlock, tamarac, white cedar, maple, ash, white oak, and, on some of the mountain slopes, white pine. Puget Sound is now the greatest timber mart of the Pacific seaboard; while the abundance of coal, water-power, and iron ore in the vicinity of navigable waters, together with fine harbors, large saw-mills, and natural facilities for manufacturing cordage, all clearly indicate that the Puget Sound country will at no distant day occupy a prominent position in shipbuilding. — The climatic characteristics of E. *W.* in winter correspond with those of Pennsylvania, while the summers are dry and hot. The annual rain-fall is only about one fourth as much as in the vicinity of Puget Sound. W. of the Cascade Range, the meteorological conditions differ essentially from those of the E. section. It is not unusual for the winter months to be mild, without snow or ice. The summers are unsurpassed in loveliness. — The mineral resources of the Territory are, as yet, comparatively undeveloped. Coal of excellent quality is found in abundance near Bellingham Bay, Shoakmin River, and streams leading into Lake Whatcom, W. of the Cascade Mountains. Large quantities of this article are annually shipped to the San Francisco market, where it is principally consumed by ocean steamers. Gold has been discovered in considerable deposits in the waters flowing from the Coast or Olympia Range; and rich placer diggings exist on the banks and bars of the Yakama, Wenatchee, and Okinegon Rivers. — *W.* constitutes one customs district, that of Puget Sound, of which the port of entry is *Port Townsend*, a small town, with a good harbor, about 74 m. in direct line N. of Olympia. The value of imports from foreign countries for the year 1879 was $26,522; of exports, $558,918; including 43,833,000 ft. of assorted lumber, valued at $355,651. The number of entrances was 356, with an aggregate tonnage of 182,867; clearances 362, tonnage 189,787. The entrances in the coastwise trade were 104, tonnage 76,672; clearances 65, tonnage 45,769. There were 16 vessels built, aggregate tonnage 965; number of vessels owned in the district 116, tonnage 29,954. The value of the fisheries, according to the last census, was $289,746. The product consisted of 2,143 barrels of salmon, 1,810,000 lbs. of canned salmon, 1,000 quintals of cod, and 70,000 bushels of oysters. In 1879, *W.* had 212 m. of railroad, divided into 5 lines, as follows: —

Companies.	Total length.	Length in Territory.
	Miles.	Miles.
Cascade Portage	6.00	6.00
Northern Pacific	585.50	136 50
Olympia	15.00	15.00
Seattle and Walla-Walla	22.50	22.50
Walla-Walla and Columbia River	32.00	32.00

Washington City, Virginia, Midland, and Grand Southern R. R. runs from Alexandria, Va., to Danville, N. C., 238.50 m.; branches, Manassas Junction to Strasburg, 63.37 m., Warrenton Junction to Warrenton, 8.50 m., Strasburg to Harrisonburg, 49.13 m.; total of lines owned, 359.50 m. This Co., located at Alexandria, Va., is the consolidation, in 1872, of the Orange, Alexandria, and Manassas, and of the Lynchburg and Danville R. R. Cos. On default in interest, the road was placed in the hands of a receiver in 1876. Cap. stock, $4,265,296; funded debt, $6,747,067 (exclusive of hypothecated bonds, $1,360,400); floating debt, $1,859,661; total stock, funded and floating debts, $12,872,025. Cost of road and equipments $10,143,393.

Washington Fire and Marine Insurance Co., located in Boston, Mass., organized in 1873. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $400,000; net surplus, $273,693. Risks in force, $14,057,516; premiums, $192,694. Premiums received since the organization of the Co., $1,928,507; losses paid, $1,034,153; cash dividends paid to stockholders, $200,000.

Washington Life-Insurance Co., located in New York City, organized in 1876. *Statement*, Jan. 1, 1880: Assets, $5,591,888; liabilities, $4,662,-

566; policies in force, 10,139, amounting to $21,-447,274; premiums, $965,382; dividends paid to policy holders, $974,506.

Washing-Tub, a long, deep wooden tray or round hooped tub, for washing clothes in.

Washstand, a piece of bedroom-furniture for holding ewer and basin and other requisites for washing the person.

Waste, the refuse of cotton or silk. — Untilled ground.

Waste-Basket, a small office or library basket, for holding loose waste papers.

Waste-Book, a tradesman's book for making rough entries in.

Waste-Paper, spoiled paper; old office writings, newspapers, etc., bought by waste-paper dealers, to sell again to store-keepers, for wrapping-paper, or to paper-makers to work up into fresh paper.

Waste-Pipe, a discharge-pipe for surplus or used water, etc.

Wastrels, waste substances.

Watch [Fr. *montre;* Ger. *Uhr, Taschenuhr;* It. *oriuolo da tasca, o da saccoccia;* Sp. *reloje de faltriquera*], a beautiful time-measuring instrument differing from a spring clock chiefly in the numerous contrivances for packing a great deal in a small space, and (except in repeaters) in the omission of the striking train. A *vertical watch* has a spring and balance for the regulation, instead of a pendulum. The small clocks made before the days of Huyghens and Hooke did not subdivide the hours into minutes and seconds; but when the balance-spring was invented, this subdivision became possible, while still retaining a very small size for the entire mechanism. Considering a watch as a small spring-clock, there is a difference between the *motion-work* and the *movement.* The parts called the *cannon pinion, minute wheel, hour wheel,* and *hands,* constituting the motion-work, can all be moved by the watch-key, without disturbing the actual going-train or movement; it is in this way that the hands can be set right, as a distinct operation from winding up. The watch is called *vertical* because it has a *fusee* with a vertical axis (see FUSEE), and cannot be made so thin or flat as might otherwise be the case. A *horizontal watch* differs from the vertical in external appearance chiefly in being thinner or flatter; but in the interior the arrangements vary much, owing to the almost interminable diversities in the form and action of the ESCAPEMENT (which see). All the varieties of *lever* and *duplex* watches owe their names chiefly to the kinds of escapement which they comprise. — *Chronometers* are watches having the variable force of their mainspring equalized by a fusee or variable lever, and also an expansion balance as a compensation for heat and cold. Nautical chronometers are larger machines of the same kind, secured in a box, and used for ascertaining the longitude at sea.

The efforts that have been made from time to time in Europe to combine the numerous branches of the watch-making business in single establishments were unsuccessful, and served only to show that the need was recognized, although the conditions of its fulfilment were absent. The despotism of the conservative spirit, the dominance of hereditary habits, the cheapness and competitions of labor, — all combined to prevent that final perfection of the industry which consisted in the simplification of its multiplied processes. It is a significant fact that this important branch of modern industry, though created by European genius, and rooted in European experience, with boundless capital at its command, and carried on by communities of artisans who were trained in watch-craft generation after generation, should nevertheless be brought to its highest stage of development in this country. Half a century after Europe had perfected the mechanism itself, the American mind perceived that another step remained to be taken, and that, to give the world the benefit of all that had been done by the constructive ingenuity of the past, the watch must be made by machinery, and all the hitherto separate branches of labor be combined in one establishment and under one direction. It is not yet thirty years since the company was formed which built the first American watch-factory at Roxbury. The undertaking was certainly a formidable one. The various sporadic attempts to make watches in this country by hand, commencing in 1812, had all failed, and there was no body of disciplined workmen to start with. Besides, the Swiss authorities would not permit the exportation of such machines, models, or drawings, as were already in use; so that the American managers had to invent their own machinery, and train their own workmen. The factory was subsequently removed, and located on the banks of the Charles River, a little above the village of Waltham, Mass., under the title of the American Watch Co. Embarked in a novel and expensive enterprise, the managers pursued a cautious but vigorous policy; and the first factory, which was even thought to be of great dimensions, rapidly expanded into an immense establishment, filled with machinery superintended by 700 hands, and turning out some 80,000 watches a year, — more than are produced in all England, and ten times as many as are made in any other establishment of the kind in Europe. An English watchmaker, in a lecture before the Horological Institute of London, describing the results of two months' close observation of the various manufactures in this country, remarked in reference to this American establishment, "On leaving the factory, I felt that the manufacture of watches on the old plan was gone." It was thus ingenuously admitted that American enterprise had made an industrial epoch, and beaten Europe in one of her oldest and most difficult productions. In this there is neither accident nor mystery, but it is the result of a great law that can be no more resisted than the flow of the Gulf Stream or the advance of knowledge. An industry which stagnated for centuries in an undeveloped condition, and which had been disintegrated for the last hundred years, was now for the first time brought into an all-connected and perfectly organized system. Single tools, which gradually expanded into simple hand-machines, with which a few of the parts of a watch had been produced, were here brought together, and hundreds of new ones, at many hundreds of thousands of dollars' cost, were created, and all interwoven, as it were, into one vast mechanical organism. A single steam-engine distributes its power by means of driving-shafts through a whole colony of similar working-rooms, and the result is the production of watches at the rate of one every three minutes, and with a uniformity and perfection which have at once and forever antiquated all previous methods of the production. At a convention held in Chicago in May, 1880, by the Watchmakers and Jewellers' Guild of the U. States, it was stated that the demands of the trade now amount to 3,000 watches a day. Of this number the large manufactories of the U. States produce 1,530 a day, as follows: the Waltham factory, 750; the Elgin, 500; Springfield, Ill., 80; Hampden Watch Company, 90; Howard, 20; Lancaster, 50; Rockford, 40. The number produced by smaller establishments was not estimated. The great body of American watchmakers are native born. — The most noted manufactories in Europe are those of Geneva, Locle, Neufchâtel, Copenhagen, Paris, Liverpool, London, and Coventry. — Some few years ago we imported watches to the value of $2,000,000 to $3,000,000; while in 1879 the value of our imports (including movements and materials) was only $920,599, of which $673,985 were from Germany, evidently consisting of cheap watches and watch materials. The value of our exports for the same year was $88,045, of which $45,144 to England (against $82,508 imports). — *Imp.* duty: all watches and watch materials, 25 per cent; glass crystals, 40 per cent.

Watch-Case, the outside covering of a watch.

Watch-Chain, a short metal chain, attached to the pendant of a watch, to suspend a key and seals to; a guard-chain for a watch carried in the waistcoat pocket.

Watch-Finisher, a workman who puts the parts of a watch together, and employs a wheel and fusee cutter, and other workers in smaller branches.

Watch-Fitter-In, a branch of the watch manufacture, which consists in overlooking the whole, fitting hands on the dial, etc.

Watch-Glass, a small convex glass; a crystal segment of a hollow sphere, used to cover the face of a watch, in order to read the time and protect the hands. Lunette glasses are not segments of spheres, but have their edges abruptly raised, and the interior flattened; an hour-glass.

Watch-Guard, a ribbon or chain worn round the neck, attached to a watch pendant.

Watch-Jeweller, the person who attends to

the diamond-cutting, setting, making ruby holes, etc.

Watch-Key Maker, a manufacturer of the metal keys of different kinds, made to wind up watches.

Watch-Maker, a manufacturer, finisher, vendor, examiner, or cleaner of watches; an artificer who arranges and fits together, in due order, the separate parts of a watch, after they have been cast or prepared by special workmen.

Watchman, a night-guardian or policeman.

Watchman's Time-Detector. See DETECTOR.

Watch-Spring, the fine steel mainspring (see Fig. 27) which, being fastened at one end of the barrel, and at the other end to an arbor or axle, unwinds off the fusee, turning it, and keeping the watch going, while the action accords by its varying size with the varied energy of the spring. By the force thus produced other wheels are put in motion, from which the time is exactly measured by the hands on the dial.

Watch-Work, the steel, brass, and other machinery and parts of a watch.

Water. This, the most important of all liquids, presents its uses in such multifarious forms that almost the whole range of science would have to be appealed to in the illustration of them. A few of the more salient properties only need be mentioned here. Pure water, chemically considered, consists of 8 oxygen to 1 hydrogen by weight; whatever else it may contain does not naturally belong to it. It is liquid at all ordinary temperatures, but becomes, under average pressure, solid (*ice*) at and under 32° F., and aëriform (*steam*) at and above 212° F. A cubic inch weighs about 250 grains; a cubic foot about 63 lbs. avoirdupois, or about 1,000 oz. A ton of water is reckoned at 224 gallons. Water is taken as a convenient unit or standard for the specific gravity of solid and liquid bodies generally; thus, water being 1, and lead 11, means that lead is 11 times as heavy as an equal bulk of water; and thus 11 is said to be the specific gravity of lead. Water is with great difficulty compressible, and conducts heat slowly. It is affected in color, taste, odor, and other qualities by the differences which mark it as obtained from rain, dew, springs, rivers, wells, lakes, marshes, and seas; and especially such kinds as are called *mineral* waters. Sea-water contains something like 5 per cent of salts of soda, potash, magnesia, and lime, especially chloride of sodium, which gives it its characteristic salt taste.

Water-Closet, a commode with water-supply to empty the basin and carry off the contents.

Water-Cock, a tap for drawing water; a street plug to supply water from the mains in case of fire.

Water-Colors, pigments ground with water and gum, or size, which preserve their consistency in a solid cake when dried, and can easily be mixed with water, by rubbing them on a moistened palette when wanted. The term is used in contradistinction to *oil-colors*. — *Water-color paintings* are drawings or paintings executed on various kinds of paper with water-color paints.

Water-Cooler, a porous jug; a fountain or contrivance in which water and ice are cased with a non-conducting material to prevent access of heat.

Water-Course, the bed of a stream; a channel for water through a town or fields.

Water-Crane, a machine for supplying water to locomotive engines.

Water-Cress, a wholesome aquatic vegetable of the mustard family, the *Nasturtium officinale*, a native of North Europe, cultivated in this country as a salad herb.

Watered Silk, silk for ladies' dresses, subjected to a process which gives a peculiar appearance to their surface as seen by reflected light. It is done by passing the silks in a damp state between rollers, some of which are variously indented or engraved, or it may be produced by the pressure of one fold of the piece laid transversely or diagonally upon another and pressed between revolving cylinders. — *T. McElrath.*

Waterford. See GREAT BRITAIN.

Water-Gauge, a tide-gauge; a rain-gauge; any measure of the depth or fall of water.

Water-Gilding. See GILDING.

Water-Glass, same as soluble glass.

Watering-Place, a seaside resort; a town frequented for drinking mineral waters or bathing. — An oasis in the desert where caravans obtain water from a well; a pond or water-hole for cattle. — A spring or river whence ships are supplied.

Watering-Pot, a metal pot with a rose or perforated spout for watering plants.

Water-Lily, a general name for species of *Nimphæa*, beautiful plants which are much cultivated. The stems of *N. alba* are superior to oak galls for dyeing gray.

Water-Logged, a marine term applied to ships which have so much water in the hold as to be unmanageable.

Water-Mark, a letter, device, or impression, wrought in paper during the process of manufacture, by means of wire or brass plates sewn on the hand-mould, or the dandy-rollers of the paper-machine. — The tide-level on a shore, indicating the extent of the rise and fall of the tide; the float-line or sinking depth of a ship.

Water-Melon. See MELON.

Water-Meter, an instrument for registering the supply of water.

Water-Mill, a flour-grinding or other mill, the machinery of which is set in motion by the action of water upon a wheel.

Water-Pipe Maker, a caster or moulder of pipes for supplying water.

Water-Plug. See WATER-COCK.

Waterproofing. See IMPERMEABLE.

Water-Tank, a fixed cistern on shore, or a metal receiver on board ship for holding water. See TANK.

Watertown Fire-Insurance Co., located in Watertown, N. Y., organized in 1867. *Statement*, Jan. 1, 1880: Cap. stock paid up in cash, $200,-000; net surplus, $110,625. Risks in force, $100,-231,128; premiums, $908,119. Premiums received since the organization of the Co., $3,185,291; losses paid, $1,501,539; cash dividends paid to stockholders, $220,000.

Water-Twist, a kind of cotton twist, of which there are common, seconds, and best seconds.

Water-Ways, the timbers of a ship connecting the sides to the deck.

Water-Wheel, a wheel with buckets for impelling a mill by water-power. The principal varieties are undershot, overshot, breast, and horizontal, turbines, pitch-back, tub, and flutter wheels.

Water-Works, the reservoir or pumping station, for supplying water to a town; hydraulic engines or structures.

Wax [Fr. *cire;* Ger. *Wachs;* It. and Sp. *cera*]. This remarkable substance is both of animal and vegetable origin. *W.* is found in plants, and naturalists formerly held an opinion that bees find the *W.* ready-made in the flowers on which they light; but the opinion now is, that the

insects elaborate it within their own bodies, out of the honey imbibed from the flower. The way in which the bees build up the honeycomb with the *W.* thus obtained, is well known as one of the most marvellous examples of instinct presented in the range of nature. When the *W.* of the honeycomb is collected by man for manufacturing purposes, the honey is drained or pressed out of it; the comb is boiled in water, melted, strained through hair-bags, and purified or refined in various ways. Beeswax is yellow during all these processes; to become white it requires bleaching. The most effective way of doing this is by exposing the *W.* for a long time to the combined action of light, air, and moisture; the process may be quickened by the use of chlorine and other agents, but the result is not quite so good. Purified *W.* is a little lighter than water, is soft enough to be kneaded at 85° F., and melts at 150°. The *W.* obtained from various kinds of trees, such as the *myrtle*, the *palm*, the *sumach*, the *sugar-cane*, and the *cork-tree*, is similar in general properties to that obtained from bees. *Japan wax*, also called tree *W.*, is obtained in the East Indies from the root of *Rhus succedanea.* It is yellowish-white and somewhat softer than beeswax. A large quantity of *W.* was formerly used in making the candles for the Roman Catholic churches; but stearine and other substances are now to some extent substituted for it. SEALING-WAX (which see) is one of the principal articles now made of *W.*; and various polishes and varnishes also absorb a large quantity of it. Much of the *W.* brought to market, especially if offered at a low price, is adulterated — earth, pea-meal, and resin being added to yellow *W.*; oxide of lead, tallow, and starch to white *W.* Beeswax is extensively produced in the U. States, and to some extent exported. The exports for the year 1879 amounted to 168,745 lbs., valued at $45,823.

Imp. duty: bay or myrtle, free; bees' (bleached or not), 20 per cent; Japan, 20 per cent; sealing, 35 per cent; shoemakers', 20 per cent; manuf. of *W.*, n. o. p. f., 35 per cent.

Waxed-End, thread covered with shoemakers' wax for sewing leather together.

Wax-Figure Maker, a moulder of wax in imitation of real persons.

Wax-Flower Maker, a modeller of flowers, fruit, etc., in wax, colored to imitate nature.

Waxing, the process of stopping out colors in calico-printing. — Rubbing thread with wax to strengthen it. — Polishing tables with beeswax.

Wax-Light, a candle or taper of wax.

Wax-Manufacturer, a melter or bleacher of wax; a maker of candles, or different articles of wax.

Wax-Modeller, an ornamental worker in wax.

Wax-Myrtle. See BAYBERRY TALLOW.

Wax-Palm, a lofty species of S. American palm, the *Ceroxyolon andicola*, from fissures in the stem of which flows spontaneously a kind of gray, waxy substance, containing two thirds of resin, and one third of wax, identical with that formed by the bee. Melted with a little suet, this wax makes excellent tapers.

Wax-Works, a collection of figures dressed to represent life, shown to the public.

Way-Bill, a carrier's invoice, in inland conveyance applied to a common carrier's document, showing the list of goods with the transport or delivery of which he is intrusted.

Ways, the timbers or slides on which a ship is launched.

Weapons, small-arms; offensive or defensive instruments.

Wearing-Apparel, generally considered to include only the clothes and personal property actually worn upon the person, and as such it is admitted free of duty into the U. States.

Weasel, the general name of the carnivorous mammals of the family *Mustelidæ*. Several specimens are of commercial importance for their fur. See ERMINE, MINK, SABLE, etc.

Weather-Cock, a vane made to show the direction of the wind.

Weaver, an operative who works at a loom.

Weaving, the art of producing cloth by the combination of flexible fibres, performed upon a frame called a loom (see LOOM).

Among all barbarous nations, *W.* consists of warping and crossing grasses, and such simple materials as are most easily attainable, and is purely darning. The long threads, running from end to end of the piece, are called the *warp*; the cross ones, interlacing from side to side, the *weft*. In the method of *W.* by darning, every alternate thread of the warp must be lifted by itself to put in the weft-shot, and that process is therefore very tedious; but when a method is employed for lifting up a certain portion of the warp at once, which is called *shedding the web*, to receive the weft-shot, this effects a great saving of time, and is *W.* in its second stage. *W.* in this state has existed from time immemorial among the Egyptians, Hindoos, Chinese, and others. *Plain W.*, where the weft-threads pass alternately over and under those of the warp, is performed at a loom, of which the essential parts are: 1st, an arrangement for stretching the warp; 2d, a contrivance for raising every alternate thread, or half the threads of the warp, and depressing the other half, so as to open a space or shed for the shuttle which carries the weft; 3d, a contrivance for striking each weft-thread close up to the one previously thrown. In *W.* with the common loom, the warp is wound upon a cylindrical beam or roller. From this the thread passes through a harness composed of movable parts, called the *heddles*, of which there are two or more, consisting of a series of vertical strings, connected to frames, and having loops through which the warp passes. Each of these heddles receives its portion of the alternate threads of the warp, so that when they are moved reciprocally up and down, the relative position of the alternate threads of the warp is reversed. Each time the warp is opened by the separating of its alternate threads, a shuttle containing the woof is thrown across it, and the thread of woof is immediately driven into its place by a frame called a *lay*, furnished with thin reeds or wires, placed among the warp like the teeth of a comb. About the latter portion of the 18th century, a loom to go by machinery was eagerly sought after, and was supposed to be an impossibility. Several were constructed and failed, and the cause of their failure, although apparently a trifling one, was, in reality, very important in *W.* by power. It was the want of a means to prevent the breakage of the yarn by the accidental stoppage of the shuttle in the shed. A Mr. Miller, however, at length invented a means, called a *protector*, by which this difficulty is obviated; and the power-loom is now enabled to perform all the motions of *W.*, uninterrupted by accidents of this sort. *Figure-weaving* requires considerable preparation in mounting the loom, and differs from plain *W.* in the number and arrangement of the heddles, and the method of moving them. As the number of heddles was in general too great to be moved by the feet of the weaver, an apparatus called the *draw-loom* was in general use until the introduction of the *Jaquard loom*. See LOOM. In 1857, Mr. N. B. Carney, of New York, patented a method of *W.* fabrics within, and upon, a circular frame or loom, the shuttle being carried in a circle round the frame with a continuous movement, the warps, shuttles, and filling being placed at the top of the loom, and a reciprocating movement being continuously given to heddles lying horizontally about the loom, so as to produce the shed properly in front of the shuttle. In the same year, Mr. E. B. Bigelow, of Boston, patented a method of weaving pile fabrics double, by means of transverse intersecting pile wires woven between the two fabrics so as to keep them properly apart, with movement at the same time of two shuttles, and an arrangement connecting each shuttle with the shipper, or disconnecting lever of the loom, so that, when the filling fails in either shuttle, the loom is thrown out of gear. Other American inventions in connection with the improvement of the power-loom have been very numerous, but comparatively few changes of a radical character have been introduced.

Web, linen cloth; anything woven.

Webbing, a strong web put under chair and sofa bottoms, etc., and across saddle trees.

Wedding-Ring, a lady's plain, pure gold ring, given by the bridegroom to his future wife at the ceremony.

Wedge, a body, as of wood or metal, thick at one end and sloping to a thin edge at the other,

used in splitting timber, rocks, etc. It is one of the five simple engines or mechanical powers, and, as such, performs its office sometimes in raising heavy bodies, but more frequently in dividing or cleaving them; hence, all those instruments which are used in separating the parts of bodies, such as axes, adzes, knives, swords, colters, chisels, planes, saws, files, spades, etc., are only different modifications that fall under the general denomination of the *wedge*.

Wedgwood Ware, a fine kind of English pottery, named after Josiah Wedgwood, who carried out many improvements in the manufacture. Technically, *Wedgwood ware* is the name of one particular kind of goods introduced by him; but in reality there are several quite as closely associated with his name and his labors. — *Queen's ware*, or *cream-colored ware*, patronized by Queen Charlotte, was made by combining metallic oxides with pipe-clay and sand; it laid the foundation of his fortune. — *Terra-cotta*, a ware which imitated porphyry, granite, and other kinds of hard stone. — *Basalt*, a black ware nearly as hard as flint. — *Porcelain biscuit* and *iron-stone china*, differing from basalt chiefly in being white or colored. — *Bamboo ware*, a kind of cane-colored biscuit. — *Jasper*, a very delicate white biscuit, suitable for cameos and statuettes. Taking the middle path between

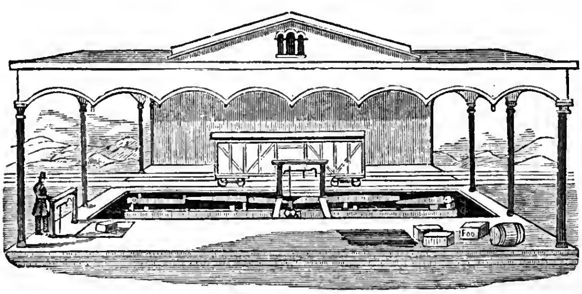

Fig. 490. — Railroad Weighing-Machine.

opaque pottery and translucent porcelain, Wedgewood produced many exquisite works combining the characteristics of both — of which his imitations of the Portland Vase are the best known.

Weft. See Weaving.

Weigh, to poise; to estimate the ponderosity of an article by the steelyard balance, scales, etc. To lift an anchor from the ground.

Weigher, one employed to weigh commodities. — An officer of the customs, whose duty it is to weigh foreign merchandise as it is unladen from the vessel.

Weighing-Machine, as distinguished from balances, scales, steelyards, etc., is larger in size, and intended to weigh heavier masses. On turnpike roads there is a rule that the weight of a loaded wagon must not exceed a certain ratio to the breadth of the wheel, as a precaution against wearing down the road material too rapidly. Weighing-machines are placed at certain localities to test this matter, the whole wagon and its contents being weighed at once. The wagon is drawn upon a platform which is over a cavity in the roadway; the platform is supported only on four points, which points are the ends of four levers; these levers act upon some kind of index or telltale. When the wagon is on the platform the latter sinks a little; and the amount of this sinking is made, through the action of the levers, to work a graduated scale which shows the total weight of wagon and load. This form of weighing-machine is mostly confined to toll-gates, but it is also used in other ways. The machines for weighing goods at railroad and canal stations and depôts are of intermediate character between the common balance and the weighing-machine, combining something of the action of both.

Weights and Measures. Weights are used to ascertain the gravity of bodies, — a quality depending partly on their magnitude and partly on their density. Measures are used to determine the magnitude of bodies, or the space which they occupy. — Neither the magnitude nor the weight of any one body can be determined, unless by comparing it with some other body selected as a standard. It is impossible, indeed, to form any idea in respect of magnitude or weight, except in relation to some definite space or weight with which we are acquainted. We say that one article weighs 1 pound, another 2 pounds, a third 3 pounds, and so on; meaning not only that these weights are to each other as 1, 2, 3, etc., but also that the weight or sp. gr. of the first is equal to the known and determinate weight denominated a pound, that the second is equal to 2 pounds, and so on. — Standards of lineal measure must have been fixed upon at the earliest period, and appear to have consisted principally of parts of the human body — as the cubit, or length of the arm from the elbow to the tip of the middle finger; the foot; the *ulna*, arm, or yard; the span; the digit, or finger; the fathom, or space from the extremity of one hand to that of the other when they are both extended in opposite directions; the pace, etc. Large spaces were estimated by measures formed out of multiples of the smaller ones; and sometimes in day's journeys, or by the space which it was supposed an ordinary man might travel in a day, using a reasonable degree of diligence. But lineal measures can only be used to determine the magnitude of solid bodies; the magnitude of bodies in a liquid or fluid state has to be determined by what are called measures of capacity. It is probable that, in the infancy of society, shells, or other hollow instruments afforded by nature, were used as standards. But the inaccuracy of the conclusions drawn from referring to them must soon have become obvious; and it early occurred that to obtain an accurate measure of liquids nothing more was necessary than to constitute an artificial one, the dimensions, and consequently the capacity, of which should be determined by the lineal measures previously adopted. The determination of the gravity or weight of different bodies supposes the invention of the balance. Nothing is known of the steps which led to its introduction; but it was used in the remotest antiquity. It seems probable that, at first, cubes of some common lineal measure, as a foot, or the fraction of a foot, formed of copper, iron, or some other metal, were used as standards of weight. When the standard was selected, if it was desired to ascertain the specific gravity or weight of any given article, all that was necessary was to put it into one of the scales of the balance, and as many cubes or parts of cubes on the other as might be necessary to counterpoise it. Weights have, however, been frequently derived from grains of corn. Hence in this, as in England, and some other European countries, the lowest denomination of weight is a

grain; and 32 of these grains are directed by the ancient English statute called *Compositio Mensurarum*, to compose a pennyweight, whereof 20 make an ounce, 12 ounces a pound, and so upward. — In every country in which commercial transactions are extensively carried on, the importance of having weights and measures determined by some fixed standard becomes obvious to every one. But as the size of different parts of the human body differs in different individuals, it is necessary to select some durable article — a metallic rod, for example — of the length of an ordinary cubit, foot, etc., and to make it a standard with which all the other cubits, feet, etc., used in mensuration shall correspond. These standards have always been preserved with the greatest care; at Rome they were kept in the temple of Jupiter, and among the Jews their custody was intrusted to the family of Aaron. The principal standards used in the ancient world were the cubit of the Jews, from which their other measures of length, capacity, and weight were derived; and the foot of the Greeks and Romans. In England, ancient historians tell us that a new, or rather a revived, standard of lineal measure was introduced by Henry I., who ordered that the ulna, or ancient ell, which corresponds to the modern yard, should be made of the exact length of his own arm, and that the other measures of length should be raised upon it. This standard has been maintained, without any sensible variation. In 1742 the Royal Society had a yard made, from a very careful comparison of the standard ells or yards of the reigns of Henry VII. and Elizabeth, kept at the Exchequer. In 1758 an exact copy was made of the Royal Society's yard; and this copy having been examined by a committee of the House of Commons, and reported by them to be equal to the standard yard, it was marked as such; and this identical yard is declared, by the act 5 Geo. IV., c. 74, to be the standard of lineal measure in Great Britain. — In modern times, the idea of seeking for a unit of weight and measure in some unchanging natural object has been practically carried into effect. The standards that have been usually proposed for this object have been some aliquot part of the quadrant of the meridian, or the length of a pendulum vibrating seconds in some given latitude. The standard of the second-pendulum has been in so far adopted into the existing system of weights and measures established in Great Britain by the act of 1823, that the length of the standard yard, as compared with that of a pendulum vibrating seconds in the latitude of London, is specified in the act as follows: "Whereas it has been ascertained by the commissioners appointed by his majesty to inquire into the subject of weights and measures, that the said yard hereby declared to be the imperial standard yard, when compared with a pendulum vibrating seconds of mean time in the latitude of London, in a vacuum at the level of the sea, is in the proportion of 36 inches to 39 inches and 1,393 ten-thousandth parts of an inch; be it therefore enacted and declared, that if at any time hereafter the said imperial standard yard shall be lost, or shall be in any manner destroyed, defaced, or otherwise injured, it shall and may be restored by making, under the direction of the Lord High Treasurer, or the commissioners of his majesty's treasury of the United Kingdom of Great Britain and Ireland, or any three of them for the time being, a new standard yard, bearing the same proportion to such pendulum as aforesaid, as the said imperial standard yard bears to such pendulum."

In the U. States, notwithstanding the power given to Congress by the eighth section of the first article of the Constitution, no direct legislation appears to have taken place in the adoption of any general standards of weights and measures; and the "only action which Congress has thus far taken on this important subject is a mere recognition of English weights, avoirdupois and troy, and a legalization of the metric weights and measures of France, if any one should see proper to use them. Fortunately for commerce, the sanction of the States and the practice of merchants, both conforming to the English weights and old English measures, have established a uniform, if not a perfect or even a very convenient system among all the States. The measures are the same throughout the Union, — a yard, a gallon, or a bushel, their multiples and sub-divisions, mean precisely the same in Texas that they do in Maine; in California the same as in Pennsylvania. In weights, also, the pound and its parts and multiples are understood everywhere to be the pound avoirdupois. When the troy pound is used for special commodities it is always denominated *troy* pound, not pound. The ton appears to be the only commercial weight which varies in different States, and, as with many of the weights of the European continent, varies also in its employment with different commodities. So far as Congress recognizes the ton, it would seem to establish it as 2,240 lbs. In Maryland, New York, and perhaps some other States, the ton is fixed by law at 2,000 lbs., but even in Maryland for coal it is 2,240 lbs., and in New York, in practice, it is 2,240 lbs. in almost all wholesale transactions with heavy goods." — *T. McElrath, Dict. of Commerce.* For further information, see METRIC SYSTEM, and the names of the different weights and measures. For an account of the weights and measures used in foreign countries, and the American equivalents, see the name of each nation; also the particular names of all the weights and measures in use in all parts of the world.

MISCELLANEOUS ENGLISH WEIGHTS AND MEASURES.

Measures of Length.

	In.	Ft.	Yds.	Pls.	Ch.	Fs.
Foot	12					
Yard	36	3				
Pole or perch	198	16½	5½			
Chain	792	66	22	4		
Furlong	7,920	660	220	40	10	
Mile	63,360	5,280	1,760	320	80	8

Particular Measures of Length.

12 lines 1 inch.	A fathom, 6 feet.
3 inches 1 palm.	A cable's length, 240 yards.
4 inches 1 hand.	A degree, 69⅛ miles, or 60 nautical miles.
A cubit, 18 inches.	A league, 3 miles.
A pace, milit., 2 feet, 6 inches.	
A pace, geomet., 5 feet.	

Square or Surface Measure.

	In.	Ft.	Yds.	Pls.	Ch.	R.
Square foot	144	1				
Square yard	1,296	9	1			
Rod, pole, or perch	39,204	272¼	30¼	1		
Square chain	627,264	4,356	484	16	1	
Rood	1,568,160	10,890	1,210	40	2½	1
Acre	6,272,640	43,560	4,840	160	10	4

A square mile contains 640 acres, 2,560 roods, 6,400 chains, 102,400 rods, poles, or perches, or 3,097,600 square yards.

Old Apothecaries' Weight.

				Troy.
20 Grains	= 1 Scruple	℈	=	20 grs.
3 Scruples	= 1 Drachm	ʒ	=	60 "
8 Drachms	= 1 Ounce	℥	=	480 "
12 Ounces	= 1 Pound	℔	=	5,760 "

Apothecaries compounded by this weight, but bought and sold their drugs by avoirdupois.

New Apothecaries' Weight.

Ounce	=	437½ grs.
Pound, 16 oz	=	7,000 "

Same as avoirdupois.

Fluid Measure.

			Marked.
60 Minims ♏	=	1 Fluid Drachm	f ʒ
8 Drachms	=	1 Ounce	f ℥
20 Ounces	=	1 Pint	O
8 Pints	=	1 Gallon	gal.

Particular Weights.

A Stone, Horseman's weight	=	14 lb.
A Firkin of Butter	=	56 "
A Firkin of Soap	=	64 "
A Barrel of Raisins	=	112 "
A Barrel of Soap	=	256 "
A Fodder of Lead, London and Hull	=	19½ cwt.
" " Derby	=	22½ "
" " Newcastle	=	21¼ "

Measures of Time.

60 Seconds	=	1 Minute.
60 Minutes	=	1 Hour.
24 Hours	=	1 Day.
7 Days	=	1 Week.
28 Days	=	1 Lunar Month.
28, 29, 30, or 31 Days	=	1 Calendar Month.
12 Calendar Months	=	1 Year.
365 Days	=	1 Common Year.
366 Days	=	1 Leap Year.

Angular Measure.

60 Seconds	=	1 Minute.
60 Minutes	=	1 Degree.
30 Degrees	=	1 Sign.
90 Degrees	=	1 Quadrant.
4 Quadrants, or 360°	=	1 Circumference or Great Circle.

Cubic or Solid Measure.

1728 Cubic Inches	=	1 Cubic Foot.
27 Cubic Feet	=	1 Cubic Yard.
40 Do. of Rough or 50 Do. of Hewn Timber	=	1 Ton or Load.
42 Cubic Feet of Timber	=	1 Shipping Ton.
108 Cubic Feet	=	1 Stack of Wood.
128 Cubic Feet	=	1 Cord of Wood.
40 Cubic Feet	=	1 Ton Shipping.

Liquid Measure.		Gals.	Qts.	Pts.
Four Gills, one Pint	=	..	..	1
Quart	=	..	1	2
Gallon (Imperial)	=	1	4	8
Firkin or Quarter Barrel	=	9	36	72
Kilderkin or Half Barrel	=	18	72	144
Barrel	=	36	144	288
Hogshead of Ale (1½ barrel)	=	54	216	432
Puncheon	=	84	336	672
Butt of Ale (3 barrels)	=	108	432	864

Practically, the only measures in use are gallons and quarts, the others are merely nominal. 100 U. States gallons are equal to 83.33 imperial gallons. 100 imperial gallons are equal to 120 U. States gallons.

Dry or Corn Measure.

4 Quarts	=	1 Gallon.
2 Gallons	=	1 Peck.
4 Pecks	=	1 Bushel.
3 Bushels (four of corn)	=	1 Sack.
12 Sacks	=	1 Chaldron.
8 Bushels or two sacks	=	1 Quarter.
5 Quarters	=	1 Load.

100 U. States bushels are equal to 97.087 English or imperial bushels. 100 imperial bushels are equal to 103.031 American bushels.

Measures of Weight — Avoirdupois.

27$\frac{11}{32}$ Grains	=	1 Drachm = 27$\frac{11}{32}$	Grains.
16 Drachms	=	1 Ounce = 437½	Grains.
16 Ounces	=	1 Pound = 7,000	Grains.
8 Pounds	=	1 Stone of Butcher's Meat.	
14 Pounds	=	1 Ordinary Stone.	
28 Pounds	=	1 Quarter (qr.).	
4 Quarters	=	1 Hundredweight (cwt.).	
20 Cwt	=	1 Ton.	

This weight is used in almost all commercial transactions and common dealings.

Hay and Straw.

Truss of straw, 36 lb.
Truss of Old Hay, 56 lb. (after 1st September).
Truss of New Hay, 60 lb.
Load, 36 Trusses = Straw, 11 cwt. 2 qrs. 8 lb.; Old Hay, 18 cwt.; New Hay, 19 cwt. 1 qr. 4 lb.

Wool.			cwt.	qr.	lb.
7 Pounds	=	1 Clove	0	0	7
2 Cloves	=	1 Stone	0	0	14
2 Stones	=	1 Tod	0	1	0
6½ Tods	=	1 Wey	1	2	14
12 Sacks	=	1 Last	39	0	0

Troy Weight.

3⅙ Grains	=	1 Carat.	
24 Grains	=	1 Pennyweight.	
20 Pennyweights	=	1 Ounce	480 grs.
12 Ounces	=	1 Pound	5,760 "

Weir, a permanent dam thrown across a river. — An enclosure for catching fish.

Weiss Beer. See Beer.

Weld, an annual herbaceous plant, the *Reseda luteola* (Fig. 491), a native of Europe, the stems and leaves of which dye a lively green-lemon yellow. The whole plant is cropped when in seed, at which time its dyeing power is greatest. Weld is found, when employed in topical dyeing, to degrade and interfere with madder colors more than other yellows, and to stain the parts wanted to be kept white. Hence it has been for long superseded by quercitron bark in calico-printing. It is, however, employed in dyeing silk a golden yellow, and in paper-staining. The yellow water color called *Dutch pink* is obtained from it. *Imp.* free.

Fig. 491. — Weld.

Weldbores, a kind of woollen goods, manufactured at Bradford, England.

Welding is one of the many modes of uniting two pieces of metal. Two surfaces of iron, raised to a red heat, may be welded together by hammering, with a little sand to form a flux, which will prevent the metal from oxidizing during the process. Two iron bars may be welded end to end by making a sort of rudimentary joint or scarping in the first instance. If well done, the place of union is as strong as any other part of the compound bar. Iron is one of the few metals which possess this valuable property. Many important articles of manufacture depend intimately on this welding property of iron. Horn, tortoise-shell, and a few other substances can be subjected to a similar process of welding.

Well, a pit sunk to arrive at springs, for obtaining water. Considered as part of the great subject of water supply, the construction of a well belongs to civil engineering; but a little may be said here concerning the mechanical means employed.

Wells, until modern times, were simply circular pits sunk into the ground, and carried down till water was reached. The sides of the vertical shaft were either lined or not, according to the hardness of the earth or rock. Digging, ladders, hauling ropes, and a windlass are the chief agencies employed in merely sinking the well itself. In lining or *steining* wells, slate, timber, or mortar is sometimes employed to make out the brickwork; but in the best works only good bricks and durable cement are used. Puddling with rammed clay, or still more advantageously, concrete, is introduced behind the bricks when the soil is wet or loose. Sometimes the soil is so fully saturated with land-springs that an iron cylinder is used at certain parts, to keep out the water. The adoption of these open wells, however, has been very much lessened since the introduction of *Artesian* wells, so named from being first used at Artois, in France. An Artesian well is not a large pit or

shaft *dug*, but a small tube *bored;* the former is lined with brickwork, the latter only by a metal tube. Wells of somewhat similar construction were not quite unknown to the ancients; but it is only in recent times that the method has developed itself into a system. To make an Artesian well successful, there must not only be water underneath, but a connection between that water and springs at a higher source, so as to obtain a pressure or head. When a proper point is selected, a hole is pierced vertically downwards by means of boring tools affixed to boring rods, and the rods worked by mechanical or other power. A metal tube is slid down as fast as the bore-hole is made, and then the well is virtually complete. How far the work will have to be carried before a good supply of water is reached is the great question at issue; and a second question is, will the water spontaneously rise quite up to the surface? In some Artesian wells the water not only ascends to the top, but constantly flows over; whereas in others it does not reach the top, and has to be pumped up by ordinary means. The supply of water in some wells fluctuates greatly from time to time; and it is often found that an extra draught at one well affects the supply of others in the neighborhood.

Wellington. See New Zealand.

Welsh-Flannel, the finest kind of flannel, made from the fleeces of the flocks of the Welsh mountains, chiefly manufactured by hand. It is held in high repute for under-vestments and other purposes.

Welsh-Rabbit, toasted cheese seasoned with mustard, etc.

Welt, a joint or fold; a border or edging. — The inner lining reaching to the edge of the sole of a boot or shoe.

Welted Brocades and Quilts, articles with folds, lined and ribbed.

Welt-Shoulders, a name in the leather trade for curried leather, fit for the welts of boots and shoes.

Westchester Fire-Insurance Co., located in New Rochelle, organized in 1870. *Statement*, Jan. 1, 1880: Cap. stock paid up, $300,000; net surplus, $121,502. Risks in force, $69,065,004; premiums, $668,992. Premiums received since the organization of the Co., $6,631,516; losses paid, $3,674,597: cash dividends paid to stockholders, $218,000.

Western Australia, a British colony in Australia, formerly called the "Swan River Settlement" (from the locality of the first colony on this coast), includes all that portion of Australia W. of lon. 129° E., the most westerly point being in lon. 113° 15′ E., and from lat. 13° 45′ to 35° 5′ S. Its extreme length, therefore, is, from N. to S., 1,600 m., and 1,000 m. from E. to W.; area, 975,824 sq. m. Capital, Perth. Pop. 27,321.

The occupied portion of the colony extends along the W. coast for about 1,200 m., by perhaps 150 m. in average breadth. The remainder, except the N. part of the territory, is an arid, sandy desert, without any streams, and almost entirely without water; numerous salt marshes, however, occur in the S. It was first settled in 1829, and for many years made but little progress, notwithstanding the salubrity of the climate, which is equal to that of any part of the Australian continent. It is, however, now gaining ground. The cultivation of the land has been much retarded by the want of sufficient labor; bands of fertile soil, where sandalwood and other trees grow abundantly and which are suitable for the culture of the vine, olive, and fig, occur in the middle districts. The produce of the vintage exceeds 25,000 gallons per annum. Good wheat-growing soils also exist over large areas in the N. division, and the produce is of good quality and yield. Magnetic iron, lead, copper, and zinc ores are found in large quantities. There are 78 m. of railroad open. The imports chiefly consist of sugar, tea, tobacco, spirits, beer, soap, ironmongery, clothing of various kinds, etc. The exports consist chiefly of wool, jarrah timber, lead, copper ore, — which is exceedingly rich, — whale oil, guano, sandalwood, pearls, and pearl shells. The value of imports for the year 1878 was $1,813,530; of exports, $1,866,755.

Western Maryland R.R. runs from Baltimore to Williamsport, Md., 90 m. This Co., located in Baltimore, was chartered in 1853, and the road was completed in 1873. Cap. stock, $682,250; funded debt, $3,675,000. Cost of construction and equipment, $4,288,702. This road was constructed with the efficient help of the city of Baltimore.

Western Pennsylvania R.R. runs from Blairsville to Allegheny City, Pa., 63.50 m.; Butler Branch, 21.05 m.; total length of road, 84.55 m. This Co., located in Philadelphia, was organized in 1864; the main line was completed in 1865, and the Butler Branch in 1870. The road is rented to the Pennsylvania R.R. Co., the lessees paying over to the lessors the net earnings. Cap. stock, $1,022,-450; funded debt, $3,000,000. Cost of road, $3,-986,211.

Western Union R.R. runs from Racine, Wis., to Rock Island Junction, Ill., 192 m.; branches, 20.75 m.; total length of lines, 212.75 m. This road, located at Racine, is the consolidation (Jan. 17, 1866) of the Racine and Mississippi and the Northern Illinois R.R. Cos. Cap. stock, $4,000,000; funded debt, $3,500,000. Cost of roads and equipment, $8,069,445. This Co. defaulted on the interest due on its bonds, Feb. 1, 1879.

West Indies, an Archipelago of islands which extend from the Gulf of Florida to the Gulf of Paria, and form part of the division Central America, between lat. 10° and 28° N., and lon. 59° and 85° W.; bounded N. and E. by the Atlantic, S. by the Caribbean Sea, which separates them from the N. coast of South America. The N. W. group contains the largest islands, or Greater Antilles, as Cuba, San Domingo, Jamaica, and Porto Rico. The other group, or Lesser Antilles, stretching from N. to S., consists of Guadaloupe, Martinique, Barbadoes, Trinidad, etc. The Bahamas form a third group. The Lesser Antilles, from Porto Rico to the Gulf of Paria, are by some writers called the Windward Islands, and the smaller group along the coast of Venezuela, the Leeward Islands; but in British charts the *Windward Islands* comprise those between lat. 10° and 15° N., and the *Leeward* those between lat. 15° and 19° N. The political divisions, area, and pop. of the *W. I.* are as follows: —

Islands.	Belonging to	Area, sq. m.	Population.
Hayti, or Santo Domingo	Two independent republics. Hayti	10,204	572,000
	and San Domingo	18,000	136,500
Cuba, Porto Rico, Isle of Pines, and dependencies.	Spain	47,278	2,184,438
The Bahamas, Jamaica, and most of the Lesser Antilles (Trinidad, Tobago, Grenada, Barbadoes, St. Vincent, St. Lucia, Dominica, Montserrat, Antigua, St. Christopher, Barbuda, Anguilla, most of the Virgin Islands, etc.)..	Great Britain	13,754	1,063,886
Guadeloupe, Désirade, Martinique, Marie Galante, Les Saintes, N. part of St. Martin's, all in the Lesser Antilles.................	France.......	1,094	316,457
Curaçoa, Buen Ayre, Oruba, Los Roques (off Venezuela); St. Eustatius, Saba, and S. part of St. Martin's (Lesser Antilles).........	Netherlands..	435	36,871
St. John's, St. Thomas, and Santa Cruz (Virgin Islands)	Denmark.....	138	37,700
St. Bartholomew (Lesser Antilles)................	Sweden	8	2,900
Margarita, Tortuga, etc. (off Venezuela)......	Venezuela....	442	30,983
Total.................	....	95,929	4,381,735

The general aspect of the *W. I.* archipelago is mountainous. Many of the islands exhibit manifest proofs of volcanic origin; and they are all subject to violent shocks of earthquakes. Their soil is in general very productive; moisture and heat combining to produce a surprising luxuriance of vegetation.

Sugar, coffee, cotton, dye-woods, and spices are the chief products and exports. The year, as in most tropical climates, is divided into two seasons, the *dry* and the *wet*; yet four may be distinguished, — the spring, with gentle showers in April and May; the hot, sultry summer, from May till October, when the heavy autumnal rains begin, and continue till December; from which till April, in fact the winter, serene and cool weather prevails. Between August and the end of October, the islands, except Trinidad and Tobago, which lie farthest S., are subject to furious hurricanes; these, however, are not very frequent, and are unknown except during this short period. — Particular descriptions are given under the names of all the islands of some commercial importance. Reference to this head, however, was given for the four following names: —

Antigua, one of the Leeward Islands, belonging to Great Britain, 40 m. N. of Guadaloupe, is oval-shaped, and about 20 m. in length. It has comparatively little of the mountainous character, is without rivers, and the climate is remarkable for its want of moisture. Capital, St. John, on the N. W. side, lat. 18° 22′ N., lon. 64° 42′ W.; but the best port is English Harbor on the S. coast. Chief exports, sugar, molasses, and rum. Pop. (mostly black), 34,344.

Bahamas, *Bahama Islands*, or *Lucayos*, a chain of islands stretching in a N. W. direction from the N. Side of San Domingo to the coast of E. Florida, and belonging to the British. Lat from 21° 23′ to 27° 50′ N.; lon. 70° 30′ to 79° 5′ W. It is composed of innumerable rocks, islets (called *keys*), and islands, of which not more than 14 are inhabited: these are New Providence, Turk's Island, Eleuthera, Exuma, Harbor Island, Crooked Island, Long Island, St. Salvador, Caicos, Watling's Island, Rum Key, and Great Inagua, Great Bahama, and Lucayo, now called Abaco. Area, 3,021 sq. m. Capital, Nassau (in New Providence). Pop. 42,000. The principal islands are situated on those remarkable flats called the Bahama Banks, of which the Great Bank (lying at the W. extremity of the archipelago) occupies an extent of 300 m. in length N. W. and S. E., and 80 m. in breadth; the deepest water on any part of this bank is 30 ft., but the patches of coral rock and dry sand are innumerable. These banks rise almost perpendicularly from an unfathomable depth of water, and are formed of coral, with an accumulation of shells and calcareous sand. The character of the islands is generally long and narrow, low, and covered with a light, sandy soil, their figure and surface throughout being nearly the same. At the greatest depth yet reached by digging, nothing has been found but calcareous rock, with an intermixture of shells. — The soil is mostly light or sandy, but is here and there spotted with patches of good land, producing cotton, Indian corn, oranges, pine-apples, and vegetables. In general, the Bahamas are ill supplied with fresh water; but this is found, however, by digging wells in the rocks to the depth of the sea-level. — The climate is salubrious. The more N. islands, during the winter months, are rendered cool and agreeable by the N. W. breeze that blows from off the continent of America; the more S. are hotter throughout the year, being low, barren, and rocky. — The chief exports are cabinet-woods, sponges, fruit, shells, salt, cascarilla bark, arrow-root, etc.

Barbadoes, one of the Windward Islands, the most E. of the Caribbean chain and oldest of the British W. India colonies, is about 21 m. in length, and 14 in breadth. The surface, though irregular, is comparatively low, and is almost all highly cultivated; while, being directly exposed to the N. E. trade-wind, it is cooler and more salubrious than any of the other islands. Capital, Bridgetown, in Carlisle Bay, on the S. W. coast, in lat. 13° 5′ N., lon. 59° 41′ W. The chief articles of export are sugar, rum, and arrowroot. The island is almost encircled by coral reefs, which render the approaches to it dangerous to mariners. Pop. 176,000.

The Bermudas, or *Somer's Islands*, a group of small islands about 300 in number (of which 15 or 16 only are inhabited), in the N. Atlantic Ocean, belonging to Great Britain, stretching N. E. by E. and S. W. by W., about 20 m., the light-house on Gibb's Hill being situated in lat. 32° 14′ 54″ N., lon. 64° 53′ W., 580 m. S. E. of Cape Hatteras. Area, about 41 sq. m. When viewed from the sea, the elevation of these islands is trifling, the highest land scarcely attaining to a height of 200 ft. They are almost everywhere surrounded by extensive coral reefs, the channels through which are extremely intricate, and can only be safely navigated by native pilots. The principal islands are those of Bermuda, St. George, Ireland, and Somerset. The protection afforded to shipping by their numerous bays, and their position in the track of the homeward bound W. India vessels, have led to the conversion of the Bermudas into a maritime rendezvous, and as, likewise, the British naval station in W. Indian waters. The harbor of St. George's Island has been greatly improved, is protected by a breakwater, and has water and space enough to float the entire U. States navy. — The principal products are fruits, vegetables, maize, and tobacco. Pine-apples are very abundant and largely exported. — The climate is mild and salubrious; almost realizing the idea of a perpetual spring. Fish abounds, and forms a profitable source of industry to the inhabitants. Breadstuffs, etc., are imported from the U. States, and manufactured goods from England. Hamilton, on Bermuda Island, is the seat of the colonial government. Pop. 16,612.

West Jersey R.R. runs from Camden to Millville and Bridgeton, N. J., 59.49 m.; leased lines, 68.96 m.; total length of lines operated, 128.45 m. This Co. was chartered in 1853, and the road was completed in 1862. Cap. stock, $1,359,750; funded debt, $2,400,000. Per contra: cost of construction and equipment, $2,246,159; real estate, $191,677; stocks and bonds, $1,139,448; sinking fund, $174,-667.

Westphalia Cheese. See Cheese.

West Virginia, a State of the American Union situated between lat. 37° 30′ and 40° 30′ N., and lon. 0° 45′ and 5° 30′ W., from Washington, is bounded N. by Pennsylvania and Ohio, N. W. by the latter State, S. W. by Kentucky, S. and E. by Virginia, and N. E. by Maryland. Estimated area, 24,000 sq. m., or 14,496,000 acres. It is divided into 54 counties. Wheeling (separately given below) is the capital and largest city. Pop. 525,000.

With the exception of the Cos. of Hardy, Hampshire, Morgan, Berkeley, Jefferson, and Pendleton, which are drained by the Potomac River and branches, the whole of *W. V.* geographically belongs to the great Mississippi Valley — the greater number of her streams being tributaries of the Ohio River, which forms the W. boundary of the State to an extent of 300 m. Through those channels *W. V.* is placed in direct communication with the markets of the far West and the Gulf of Mexico, and, in fact, with the trade of the whole Mississippi Valley. The Alleghany ridge forms in this State the watershed between the Atlantic Ocean and the Mississippi Valley. The principal rivers are the Sandy, the Guyandotte, and the Great and Little Kanawha, all affluents of the Ohio; and the Monongahela with its tributaries, the Youghiogheny and Cheat, W. of the Alleghany range and that of the Shenandoah on the E., and the Greenbrier and Laurel Mountains on the W., are numerous short parallel ridges, of which the most considerable are Potts's or Middle, Warm Spring, and Jackson's River mountains. The westernmost of these continuous chains is the Laurel ridge, with its prolongations, the Greenbrier and Flat Top mountains. Near the line of Randolph Co., the Greenbrier Mountains throw off a spur E. to the Alleghany range, and from this run half-a-dozen parallel ridges, following the usual course of the mountain chains of the State, and known as Rich, Middle, Shaver's, Cheat, and Valley Mountains. The Great Flat-Top Mountains, as the S. W. portion of this fourth ridge is called, also throws out spurs N. and N. W., called the White Oak Mountain and Barker's ridge. — *Soil.* The prevailing ingredients of the soils are silica, alumina, or pure clay, marl, lime, magnesia, and iron, which the very unevenness of the surface tends to amalgamate to the greatest practical advantage. Thus, the alluvial or bottomlands, composed of the diluvium from adjacent and distant hills, combine mechanically and chemically every kind of mineral and vegetable decomposition in the country. This soil, which varies in depth from 2 to 30 or 40 ft., produces the largest timber and the heaviest crops, and resting upon a substantial basis of dark loam and fertile clay, exceeds in reliability and endurance the black, rich, but thirsty and chaffy soils of the western prairies. The second bottom is generally representative of the rocks prevailing upon this level, with a strong admixture of the strata above, brought down by the gradual land-slips and the wash of rains, and accumulated probably to a great extent before the present vegetation took possession of the surface. On ascending, the soil is found gradually less mixed in substance and color; the timber is less varied, and on steeper planes less thrifty. When the top of the ridge is sharp and narrow, the bare rock is found but a few inches below, and not seldom protruding above the surface; but when flat or but gently inclined, as in a majority of cases, there is found a deep, arable soil, heavily coated with humus, and producing, with few exceptions, the identical kinds of timber and crops found in the alluvial valley below. Some of the most comfortable rural homesteads, surrounded by orchards, gardens, and meadows, and supplied with never-failing springs, are found upon the tops of hills some 150 to 300 ft. above the valleys. In those regions of the State where table-lands are exceptionally met with, the surface presents undulating plains, — which, but for their majestic timber, would recall to mind an Illinois prairie, — reaching along the mountain summits for miles in length and breadth, with scarcely a swell here and there sufficiently

Fig. 492. — Seal of West Virginia.

bold to divide the waters. *W. V.* is richly invested with timber, comprising many varieties of the oak and fir, the hemlock, cedar, laurel, tulip-tree, the black and white walnuts, hickory, beech, sycamore, elm, maple, birch, white and mountain ash, besides the wild-fruit and berry-bearing varieties peculiar to the surrounding States. It has been estimated that 14,000,000 acres, or nearly seven eighths, of the superficial area of the State, are as yet unimproved, and of these at least 10,000,000 acres are still in the vigor and juvenescence of original growth. — The coal measures are known to embrace the entire State, with the exception of the Lower Potomac Cos.; and the strata, with few exceptions, running nearly horizontally, or with but slight undulations, through the whole of this territory, there is scarcely a county within its bounds that does not contain one or more seams, at some distance above or below the water-level. *W. V.*, in fact, contains one thirteenth of the coal area of the whole U. States, by surface measure only, no account being taken of her greater aggregate thickness of workable seams. In Ritchie Co., 14 m. S. of Cairo Station, is found a vein of asphaltum, or solidified petroleum, which, from its geological position, and probable origin, constitutes one of the wonders of the State. The asphaltum produces upwards of 150 gallons per ton of superior oil, 30° gravity, and untold wealth is expected to be realized from this remarkable deposit. Salt is another mineral in large yield; there being, in 1870, nine furnaces in active operation in the Kanawha Valley, representing a capital of $500,000 including land, and producing 160,000 bushels per month, worth at the rate of 50 cents per bushel, $960,000 per annum. The mineral of industrial value next abundant in the State is iron, which is almost coextensive with coal, though not present in seams quite as thick or as numerous. Iron ore is so generally prevalent in various forms throughout *W. V.*, that it would be probably more difficult to surmise where it is not than where it may be found. Petroleum occurs in great quantities in many parts of the State; but as the present production of light and heavy oil does not exceed 110,000 barrels per annum from a belt of 40 sq. m., recognized as genuine boring territory, development may be regarded as scarcely begun. The remaining mineral deposits known to exist are antimony, alum, limestone, and fire and plastic clays, of superior quality. The mineral waters located within the limits of the State are many and well known, particularly the Sulphur Springs, occurring under different names — Alike free from extremes of cold and heat, of rain and drought, and at an elevation inaccessible to malaria, *W. V.* enjoys, on the whole, a climate unsurpassed by that of any other State. The distribution of rain throughout the whole State is remarkably favorable to seasonable vegetation. Total failure of crops from excess or insufficiency of humidity is unknown; and droughts are out of the question under so genial an atmosphere. — According to the last census, the total number of acres of land in farms was 8,528,394, of which 2,580,254 consisted of improved lands, 4,364,405 of woodland, and 1,583,735 of other unimproved soil; the cash value of farms under cultivation, $101,604,381, exclusive of $2,112,937 of implements and machinery; total value of farm products, $23,379,692; of orchard stuffs, $848,773; of market-gardens, $69,974; of lumber, etc., $363,668. The statistics of agricultural products for the year 1879, and the amount and value of live-stock in that year, are given in this work under the names of each of the principal crops and animals. The State, while possessing, as it does, unsurpassed water-power, excellent manufacturing sites, and a good system of turnpike roads, affording communication through every county, has not yet assumed that rank in mechanical industry to which its natural advantages entitle it. Nail and iron factories, spike-mills, foundries of stoves and castings, grist mills, saw mills, woollen mills, oil-refineries, and tanneries, constitute the main manufacturing establishments. — *W. V.* has 15 national banks in operation, with an aggregate capital of $1,756,000. There is no State funded debt. The valuation of real estate and personal property for the year 1879 was $165,559,927. Tax per capita, $0.66. — In 1879 *W. V.* had 668 m. of railroad, belonging to 11 corporations, as shown in the following table: —

Companies.	Total length of lines	Total length in *W. V.*
	Miles.	Miles
Baltimore and Ohio	435.00	241.40
Benwood Bridge	1 60	1.60
Parkersburg Bridge	1 40	1.40
Parkersburg Branch	104.00	104.00
Chesapeake and Ohio	434.60	205.92
Laurel Fork and Sand Hill	7.31	7.31
Martinsburg and Potomac	11 80	11.80
Pennsboro' and Harrisville	9.16	9.16
Pittsburg, Cincinnati, and St Louis	200.90	7.10
Pittsburg, Wheeling, and Kentucky	24 00	24.00
Shenandoah Valley	20.00	20.00
Wheeling, Pittsburg, and Baltimore	32.00	14.00
Winchester and Potomac	32.00	21 00

W. V. has the two following interior ports of delivery belonging to the U. States customs district of Louisiana, to which foreign imports may be transported in bond after appraisement at New Orleans.

Parkersburg, a fine city, the capital of Wood Co., on the Ohio River, at the mouth of the Little Kanawha River, about 95 m. below Wheeling, 195 m. E. by N. of Cincinnati by rail. It is the W. terminus of the Baltimore and Ohio R.R., which here connects with the Marietta and Cincinnati R.R. Parkersburg has an extensive trade in petroleum, which is procured in its own and neighboring cos. It has also several oil refineries, iron foundries, boiler shops, chemical works, barrel factories, large lumber mills, etc. Pop. 10.000.

Wheeling, the capital of the State, and the largest and most important place on the Ohio River between Pittsburg and Cincinnati, is finely situated at the mouth of Wheeling Creek, 92 m. below Pittsburg, but only 63 m. S. W. of that city by rail, lat. 40° 5′ N., lon. 80° 42′ W. It is the W. terminus of the Baltimore and Ohio R.R., and the Pittsburg, Wheeling, and Baltimore R.R., and the E. terminus of the Central Ohio division of the Baltimore and Ohio R.R, which connects with the Cleveland and Pittsburg R.R. at Bridgeport, on the opposite bank of the river. The hills in the vicinity contain inexhaustible beds of coal, which supply fuel at small expense for the numerous manufactories of the city, among which are extensive blast-furnaces, iron foundries, and forges, manuf. of nails, glass-ware, steam-engines, paper, cigars, etc. Wheeling is largely engaged in boat-building, 61 of which (tonnage 6,266) were built in 1879. In the same year, there were registered, enrolled, and licensed at the port of Wheeling 451 vessels of 46,874 tons.

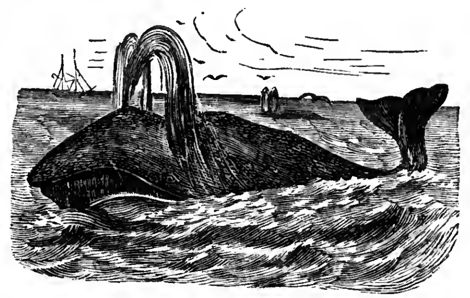

Fig. 493. — Common or Right Whales.

Wey, Weigh, an English measure of weight; for wool, equal to 6½ tods of 28 lbs.; a load or 5 quarters of wheat; 40 bushels of salt, each 56 lbs.; 32 cloves of cheese, each 7 lbs.; 48 bushels of oats and barley; 2 to 3 cwt. of butter.

Whale [Fr. *baleine;* Ger. *Wallfish;* It. *balena;* Sp. *ballena*], a large mammiferous marine animal of several species. The common or right *W.*, *Balena mysticetus* (Fig. 493), is the largest of all animals with which men are acquainted. The *W.* has sometimes, it is affirmed, been found 160 ft. in length; but this is most probably an exaggeration. In the N. seas it is at present seldom found above 60 ft. long, being now, however, generally killed before it arrives at its full growth; this is no proof that the animal may not formerly have attained to a much larger size. The bodies of *W.* are covered, immediately under the skin, with a layer of fat or *blubber*, which, in a large fish, is from 12 to 18 in. thick. In young *W.* this fatty matter resembles hog's lard, but in old ones it is of a reddish color. This is the valuable part of the *W.*, and the desire to possess it has prompted man to attempt the capture of this mighty animal. The blubber yields, by expression, nearly its own weight of a thick viscid oil (train oil). The common *W.* is now rarely found except within the Arctic circle; but at a former period it was frequently, and is now occasionally, met with on our coasts. The *Physeter macrocephalus*, or black-headed spermaceti *W.*, is chiefly found in the S. Ocean. It usually measures about 60 ft. in length and 30 in cir-

cumference at the thickest part. The valuable part of the fish is the spongy, oily mass, dug from the cavity of the head; this is crude spermaceti; and of it an ordinary sized *W.* will yield about 12 large barrels.

We do not propose entering, in this article, into any details as to the mode in which the fishery is carried on, but mean to confine ourselves to a brief sketch of its history and value in a commercial point of view. It is probably true, as has been sometimes contended, that the Norwegians occasionally captured the *W.* before any other European nation engaged in so perilous an enterprise. But the early efforts of the Norwegians were not conducted on any systematic plan, and should be regarded only in the same point of view as the fishing expeditions of the Esquimaux. The Biscayans were certainly the first people who prosecuted the *W.* fishery as a regular commercial pursuit. They carried it on with vigor and success in the 12th, 13th, and 14th centuries. The *W.* captured by them were not so large as those that are taken in the Polar Seas, and are supposed to have been attracted S. in pursuit of herrings. They were not very productive of oil, but their flesh was used as an article of food, and the whalebone was applied to a variety of useful purposes, and brought a very high price. This branch of industry ceased long since, and from the same cause that has occasioned the cessation of the *W.* fishery in many other places, — the want of fish. Whether it were that the *W.*, from a sense of the dangers to which they exposed themselves in coming S., no longer left the icy sea, or that the breed had been nearly destroyed, certain it is that they gradually became less numerous in the Bay of Biscay, and at length ceased almost entirely to frequent that sea; and the fishers being obliged to pursue their prey upon the banks of Newfoundland and the coasts of Iceland, the French fishery rapidly fell off. The voyages of the Dutch and English to the Northern Ocean, in order, if possible, to discover a passage through it to India, though they failed of their main object, laid open the haunts of the *W.* The companions of Barentz, who discovered Spitzbergen in 1596, and of Hudson, who soon after explored the same seas, represented to their countrymen the amazing number of *W.* with which they were crowded. Vessels were in consequence fitted out for the N. *W.* fishery by the English and Dutch, the harpooners and a part of the crew being Biscayans. When the Europeans first began to prosecute the fishery on the coast of Spitzbergen, *W.* were everywhere found in vast numbers. Ignorant of the strength and stratagems of the formidable foe by whom they were now assailed, instead of betraying any symptoms of fear, they surrounded the ships, and crowded all the bays. Their capture was in consequence a comparatively easy task, and many were killed which it was afterwards necessary to abandon, from the ships being already full. While fish were thus easily obtained, it was the practice to boil the blubber on shore in the N., and to fetch home only the oil and whalebone. During the flourishing period of the Dutch fishery, the quantity of oil made in the N. was so great that it could not be carried home by the *W.* ships; and every year vessels were sent out in ballast to assist in importing the produce of the fishery. But the same cause that had destroyed the fishery of the Biscayans, ruined that which was carried on in the immediate neighborhood of Spitzbergen. *W.* became gradually less common, and more and more timid and difficult to catch. They retreated first to the open seas, and then to the great banks of ice on the E. coast of Greenland. When in its most flourishing state, toward the year 1680, the Dutch *W.* fishery employed about 260 ships and 14,000 sailors. The hostilities occasioned by the American war of independence reduced the Dutch fishery to less than half its previous amount. After being excluded for 30 years from the sea, the Hollanders, who had lost all that practical acquaintance with the details of the fishery, for which they had been so famous, and which is so essential to its success, failed in their efforts to revive the *W.* fishery. In 1828, one solitary ship sailed from Holland, — a feeble and last effort of the company of Harlingen; and since then a ship or two has been occasionally fitted out by private adventurers, but generally without success. — The *W.* fishery in Great Britain, once of great magnitude, has of late years also been almost entirely abandoned. At the present time the ports of Hull and Peterhead send some 13 or 15 steamers to the Greenland seas, but chiefly for the seal fishery. — For a lengthened period the *W.* fishery has been prosecuted in the U. States with greater vigor and success than, perhaps, any other people. They commenced in 1690, and for about 50 years found an ample supply of fish on their own shores. But the *W.* having abandoned them, the American navigators entered with extraordinary ardor into the fisheries carried on in the N. and S. Oceans. From 1758 to 1775, Massachusetts employed annually 183 vessels, carrying 13,820 tons, in the former; and 121 vessels, carrying 14,026 tons, in the latter. In 1858 the *W.* fishery reached its maximum, with 686 vessels, having an aggregate tonnage of 198,594. From that time the fishery business has been steadily declining, down to 185 vessels, carrying 40,028 tons in 1879. The principal causes of the decline, besides the scarcity of *W.* from their being constantly hunted, are the increasing use of gas and mineral oils; the production of stearine and paraffine; and the substitution of steel and India rubber in many articles for which whalebone was formerly exclusively used. The number and tonnage of American vessels employed in the *W.* fishery in 1879, with the ports to which they belong, are shown in the following statement: —

Ports.	No.	Tons.
Boston, Mass.	5	531.64
Barnstable, Mass.	20	1,939.72
Edgartown, Mass.	4	720.30
New Bedford, Mass.	144	35,208.07
New London, Conn.	12	1,628.42
Total	185	40,028.15

The quantities and values of products of the *W.* fishery, taken by American vessels and fishermen, and brought into the U. States, during the year 1879, were as follows: —

Products.	Quantities.	Values.
		$
Sperm oil ... gallons	1,285,454	1,100,004
Other whale oil ... do	1,091,930	451,450
Whalebone, or baleen, split or unsplit ... pounds	228,486	412,489
Ambergris ... do	81	8,781
Other whale products	....	2,300
Other products of American whale fisheries	....	2,087
Total	....	1,977,111

Whale-Blubber. See Whale.

Whale-Boat, a long, narrow boat, used by whalers, to pursue and harpoon the whale.

Whalebone, Baleen, a substance of the nature of horn, adhering in thin parallel laminæ to the upper jaw of the whale. These vary in size from 3 to 12 ft. in length; the breadth of the largest at the thick end, where they are attached to the jaw, is about 1 ft. They are extremely elastic. All above 6 ft. are called *size bone*, and command usually double the price of those below this standard. Four kinds are distinguished in commerce: the northern (Davis's Straits), the polar, the northwest, and the southern; and though there is little difference in the quality, the two first named are sold about 20 per cent above the others. *W.* is used for the ribs of umbrellas, for stays, brushes, whip handles, the manuf. of hair cloth, canes, etc. Its high and increasing price has led to the substitution for it of steel, vulcanite, and rattan. For the year 1879, the product of the *W.* from American fisheries, was 228,485 lbs. valued at $451,489; of which we exported, chiefly to France, 78,322 lbs., valued at $199,753.

Imp. duty: Unmanuf. (from national or foreign fisheries), free; hats, bonnets, and hoods, 40 per cent; other manuf. n. o. p. f., 35 per cent.

Whale-Fins, a commercial misnomer for whalebone.

Whale-Line, a long coil of small rope fastened to a harpoon, carried in a whale-boat, to secure the whale when struck.

Whaler, a ship employed in the whale fishery; a seaman engaged in the fishery.

Whale-Shot, a name among the Dutch and some English whalers for head matter or spermaceti from the whale.

Wharf, a landing-place or mole by the water side, in a harbor or river, for landing or shipping goods.

Wharfage, the charge paid on goods to a wharfinger.

Wharfinger, the owner or occupier of a wharf; an officer or clerk appointed to attend at a wharf.

Wharncliffe-Knife, a pocket knife with one large and two small blades.

What-Not, a fancy side-board or stand for ornaments and knick-knacks in a drawing-room.

Wheat [Fr. *froment, blé;* Ger. *Weitzen;* It. *grano, formento;* Sp. and Port. *trigo*], a species of bread-corn, *Triticum vulgare*, by far the most important of any cultivated in Europe or N. America. It is raised in almost every part of the temperate zones, and in some places as high as 2,000 ft. above the level of the sea. *W.*, where the soil and climate are adapted to its growth, and the requisite progress has been made in its culture, is decidedly preferred to all other grains, and, next to maize, is the most important crop in the U. States, not only on account of its general use for bread, but for its safety and convenience for exportation. It is not known to what country it is indigenous, any more than our other cultivated cereals, all of which, no doubt, have been essentially improved by man. By some, *W.* is considered to have been coeval with the creation, as it is known that upward of a thousand years before our era it was cultivated, and a superior variety had been attained. It has steadily followed the progress of civilization, from the earliest times, in all countries where it would grow. The introduction of this grain into the N. American colonies dates back to the earliest periods of their settlement by Europeans. It was first sown, with other grains, on the Elizabeth Islands, in Massachusetts, by Gosnold, at the time he explored that coast in 1602. The following table exhibits the acreage of *W.* in the U. States, the yield per acre, the total product, the total value of product, and the total value per acre for the 16 years from 1863 to 1878 :—

Years.	Acreage.	Yield per acre.	Total product.	Total value of product.	Total value per acre.
		Bush	Bushels.		
1863.......	13,098,936	13.2	173.677,928	$197,992,837	$15 12
1864.......	13,158,089	12.2	160,695,823	294,315,119	22 37
1865.......	12,304,894	12.1	148,552,829	217,330,195	17 66
1866.......	15,424,496	10	151,999,906	333,773,646	21 64
1867.......	18,321,561	11.5	212,441,400	421,796,460	23 02
1868.......	18,460,132	12.1	224,036,600	319,195,290	17 29
1869.......	19,181,004	13.5	260.146,900	244.924.120	12 76
1870.......	18,992,591	12.4	235.884,700	245.865,045	12 94
1871.......	19,943,893	11.5	230,722,400	290,411,820	14 56
1872.......	20,858.359	11.9	249,997,100	310,180,375	14 87
1873.......	22,171,676	12.7	281,254,700	323,594,805	14 59
1874.......	24,967,027	12.3	309,102,700	291,107,895	11 66
1875.......	26,381.512	11	292,136,000	294 580,990	11 16
1876.......	27,627.021	10.4	289,356,500	300.259,300	10 86
1877.......	26,277,546	13.9	364,194,146	394,695,779	15 08
1878.......	32,108,560	13.1	420,122,400	326,346,424	10 16
Average of whole....	20,579,831	12.2	250,270,127	300,398,131	14 60
Average 1863-70..	16,117,713	12.2	195,929,511	284,399,089	17 64
Average 1871-78..	25,041,949	12.2	304,610,743	316,397,173	12 63

It should be remembered that the earlier years of this period were years of civil war, in which a portion of our *W.* area was the scene of hostile operations destructive of settled industry — hence the figures above exhibited for those years were abnormally low. From 1866, however, the first year after the close of the war, there was a steady enlargement of our *W.* acreage, more than doubling in 1878 the aggregate of 1866. Dividing the 16 years under consideration into two equal periods, we find the average acreage of the second 8 years to be 50 per cent greater than in the 8 years preceding. The average yield per acre ranged from 10 bushels per acre in 1866 to 13.9 bushels in 1877, averaging 12.2 bushels per acre during the whole period. It is remarkable that the average of the two subordinate periods of 8 years is precisely the same. This fact shows that the productiveness of our *W.* area has on the whole been maintained. As our acreage has enlarged in a greater proportion than our population our production per capita has increased. It is evident that the consumption of *W.* has increased among our own people, but not to anything like the extent necessary to absorb our late enormous crops. To account for this we must look to the immense demand for breadstuffs that has lately grown up in Western Europe. This demand is the result of restricted production. Not only unfavorable growing conditions have restricted the productiveness of the *W.* crop during the last few years, but also a change in the economic conditions of this industry. The area devoted to *W.* in Great Britain has been gradually decreasing for several years on account of the growing cost of culture and the increasing competition of other countries, especially the U. States. In 1858 the British Islands imported 23,201,941 cwt. of *W.* and flour reduced to its equivalent in grain; fifteen years later the import had doubled, amounting in 1872 to 47,612,896 cwt.; the average annual import of this period was 37,876,191 cwt. Of this average the U. States contributed 27 per cent, Russia 24, Germany 17, France 9, British America 7. During the following 6 years ending with 1878 the average import rose to 57,665,777 cwt., including flour and meal. Of this import the U. States furnished 48 per cent of the *W.* and 36 per cent of the flour; Russia less than 19 per cent of the grain and a proportion of flour too small for notice; Germany, 8 per cent of the *W.* and 14 per cent of the flour; France, 1⅔ per cent of the *W.* and less than 20 per cent of the flour; Canada, nearly 7 per cent of the *W.* and over 5 per cent of the flour. It should be noted, however, that in the last few years *W* imports from France have nearly ceased, and flour imports have fallen to about a third of the average of the period. British India sent a large contribution in 1877, but it since fell off greatly. The supplies from Australia have been very irregular, while Turkey and Egypt, once sending large supplies, have greatly declined. The reports from Great Britain, as well as the U. States, show that we are rapidly gaining the control of this trade, and that other countries in Western Europe are not only retiring from competition with us, but also that they are opening markets for the increased disposal of our breadstuffs. A social revolution is indicated by these facts. Production and consumption are regulated by conditions greatly different from what they were some years ago. The rapid enlargement of our *W.* area was necessary to meet the marked decline in European production. The proportion of our crop exported is rapidly growing.

The prices realized by the farmer have fluctuated for the last few years, but in 1878 they settled to a lower point than in any previous year. Hence, though the product of 1878 exceeded its predecessor by about 56,000,000 bushels, its aggregate value fell off over $68,000,000. This, however. was to a certain extent the result of a general decline of values to a specie basis, and therefore did not indicate a loss to the farmers at all in proportion to the figures. The cheapness of this class of agricultural products is the result of their abundance, and this enables us to transport our grain across the ocean and undersell the *W.* farmers of the high-priced lands of Europe.

The quantity of *W.* produced, imported, exported, and retained for consumption in the U. States for the years 1850, 1860, and from 1867 to 1879, was as follows :—

Year.	Production.	Imports.	Total production and imports.	Exports, domestic and foreign.	Retained for home consumption.	Consumption per capita.	Percentage exported.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	
1850..................	100,485,944	1,237,856	101,723,800	792,768	100,931,032	4.35	0.779
1860..................	173.104,924	9,623	173,114,547	4,155,153	168,959,394	5.37	2 40
1867..................	151,999,906	1,924,890	153,924,796	6,192,371	147,732,425	4.08	4 02
1868..................	212,441,400	1,616,508	214,057,908	16,133,192	197,924.716	5.35	7.53
1869..................	224,036,600	1,370,493	225,407,093	17,907,442	207,499,651	5.50	7.95
1870..................	260,146,900	851,326	260,998,226	36,996,585	224,001,641	5.81	14.18
1871..................	235,884,700	717.179	236,601,879	34,791,215	201,810,664	5.10	14.75
1872..................	230,722,400	1,546,623	232,269,023	26,999,985	205,269,038	5.06	11 62
1873..................	249,997.100	1,476,594	251,473,694	39,591,451	211,882,243	5.09	15.74
1874..................	281,254,700	1,646,092	282,900,792	71,833,749	211,067,043	4.90	25.39
1875..................	309,102,700	303,047	309,405,747	53,327,474	256,078.273	5.81	17.24
1876..................	292,136,000	1,568,558	293,704,558	56,441,828	237,262.730	5.24	19.22
1877..................	289,356,500	328,906	289,685,406	40,790,064	248,895,342	5.34	14.08
1878..................	364.194,146	1,351,008	365,545,154	73,654,621	291,890,533	6.08	21.50
1879..................	420,122,400	2,011,291	422,133,691	124,143,925	297,989,766	6.03	29.41

The following table shows the amount and value of *W.* and flour exported from the U. States for the 14 years from 1866 to 1879: —

Years.	Wheat.		
	Bushels.	Aggregate value.	Average value per bushel.
1866........	5,579,103	$7,842,749	$1 40.6
1867........	6,146,411	7,822,555	1 27.2
1868........	15,940,899	30,247,632	1 89.7
1869........	17,557,836	24,383,259	1 38.8
1870........	36,584,115	47,171,229	1 28.9
1871........	34,304,906	45,143,424	1 31.6
1872........	26,423,080	38,915,060	1 47.2
1873........	39,204,285	51,452,254	1 31.2
1874........	71,039,928	101,421,459	1 42.8
1875........	53,047,177	59,607,863	1 12.4
1876........	55,073,122	68,382,899	1 24.1
1877........	40,325,611	47,135,562	1 16.9
1878........	72,404,961	96,872,016	1 33.8
1879........	122,353,936	130,701,079	1 06.8

Years.	Flour.		
	Barrels.	Aggregate value.	Average value per barrel.
1866........	2,183,050	$18,396,686	$8 42.7
1867........	1,300,106	12,803,775	9 84.7
1868........	2,076,423	20,887,798	10 05.9
1869........	2,431,873	18,813,865	7 73.2
1870........	3,463,333	21,169,593	6 11.3
1871........	3,653,841	24,093,184	6 59.4
1872........	2,514,535	17,955,684	7 14.1
1873........	2,562,086	19,381,664	7 56.5
1874........	4,094,094	29,258,094	7 14.6
1875........	3,973,128	23,712,440	5 96.8
1876........	3,935,512	24,433,470	6 20.8
1877.......	3,343,665	21,663,947	6 47.8
1878.... ...	3,946,855	25,092,826	6 35.7
1879........	5,629,714	29,567,713	5 25.2

Summary showing the product, the area, and the value of the *W.* crop for the year 1878: —

States.	Bushels.	Acres.	Value.
Maine..............	396,200	28,300	$519,022
New Hampshire.....	189,000	13 500	279.720
Vermont	527,000	31,000	606,050
Massachusetts.......	18,260	830	27,390
Rhode Island	....	....	....
Connecticut.........	27,690	2,130	28,243
New York..........	14,128,400	743,600	14,410.968
New Jersey..........	2,497,500	166,500	2,647,350
Pennsylvania	22,095,000	1,473,000	21,432,150
Delaware	1,043,900	80,300	1,043,900
Maryland.......	6,383,000	491,000	6,255,340
Virginia............	7,068,240	981,700	6,290,733
North Carolina......	3,023,800	465,200	3,023,800
South Carolina......	732,050	133,100	951,665
Georgia	2,758,000	394,000	3,254,440
Florida	....	....	....
Alabama...........	1,255,600	172,000	1,318.380
Mississippi	428,400	63,000	578,340
Louisiana...........	....	....	....
Texas	7,200,000	450,000	6,192,000
Arkansas...........	1,038,000	173,000	986,100
Tennessee..........	7,935,000	1,587,000	6,665,400
West Virginia.......	3,737,500	325,000	3,214,250
Kentucky...........	4,910,400	528,000	3,731,904
Ohio................	33,120,000	1,840,000	28,483,200
Michigan	27,889,200	1,524,000	23,705,820
Indiana.............	33,136,000	2,071,000	26,840,160
Illinois............	34,620,000	2,325,000	23,715,000
Wisconsin..........	21,154,400	1,706,000	14,173,448
Minnesota	28,824,000	2,402,000	14,700,240
Iowa	30,440,960	3,238,400	15,220,480
Missouri	20,196,000	1,836,000	13,531,320
Kansas	27,221,000	1,670,000	16,060,390
Nebraska	13,872.900	1,059,000	6,797,721
California	41,990,000	2,470,000	43,249,700
Oregon	7,665,000	365,000	7,051,800
Nevada, Colorado, and the Territories.....	15,600,000	1,300,000	9,360,000
	420,122,400	32,108,560	326,346,424

It is remarkable that in this country the centres of production of both *W.* and corn are moving rapidly westward, and that the quantity produced in proportion to population is decreasing in some of the older and more eastern States, which is owing to the exhaustion of the soil, natural consequence of an improvident course of agriculture. There is, however, a great difference in the rate of decrease in different sections. In presenting the several groups of States, New York is classed with New Jersey and Pennsylvania as the North Middle States, and Delaware is placed with Maryland and Virginia as the South Middle. By groups the product of *W.* per capita is thus presented: —

States.	1849.	1859.	1869.	1879.
New England.............	.40	.34	.28	.30
North Middle............	5.10	3.15	3.87	3.38
South Middle............	7.72	8.41	6.43	7.58
Southern Atlantic........	1.69	2.96	1.83	2.84
Southern	.69	2.11	1.70	3.27
Ohio Valley.............	7.53	10.79	12.77	10.90
Trans-Mississippi.........	5.12	7.02	11.47	20.04
Pacific..................	2.16	15.38	27.73	27.49

The increase in the production of *W.*-growing is very striking on the Pacific coast, and particularly wonderful in California, where the crop in 1850 was only 17,200 bushels, most of the grain consumed being at that time brought from Chili. — Chicago, St. Louis, Buffalo, and New York are, in this country, the chief marts for *W.* In New York, the general classification for *W.* is *white* and *red*, the commercial varieties of which are denoted by the names of the States where the *W.* is raised. The classification adopted at the Merchants' Exchange at St. Louis is as follows: *Choice white* (to be bright, sound, dry, plump, and well-cleaned pure white winter *W,* and to weigh at least 62 lbs. per measured bushel); *No.* 1 *white* (to be sound, dry, well-cleaned, pure white winter *W.*, and to weigh at least 60 lbs. per measured bushel); *No.* 2 *white* (to be sound, dry white winter *W.*, reasonably cleaned, and to weigh not less than 59 lbs. per measured bushel); *No.* 1 *red* (to be sound, well-cleaned, dry red or red and white mixed winter *W.*, free from rye, and to weigh at least 60 lbs. per measured bushel); *No.* 2 *red* (to include all sound, dry, reasonably cleaned red or red and white mixed winter *W.* below No. 1 red, and weighing not less than 59 lbs. per measured bushel); *No.* 3 *red* (to include dry red, white or mixed thin, or bleached winter *W.*, free from must, weighing not less than 57 lbs. per measured bushel); *choice red* (to be bright, sound, plump, dry, and well-cleaned red or red and white mixed winter *W.*, to weigh at least 62 lbs. per measured bushel). All damp, tough, either very smutty or unsound *W.* of any weight; and all light, trashy, or dirty thin *W.*, falling below No. 3 in weight are rejected. — All *W.* quoted according to this classification is denominated "bulk full *W.* in elevator," while other quotations are known as "*W.* in sacks."

Imp. duty: *W.*, per bushel of 60 lbs., 20 cts. per bush.; flour, 20 per cent.

Wheel, a contrivance by means of which the intermittent and limited action of the lever is extended to any distance, and made to act continuously and uniformly. Wheels are either of the kind known as *carriage-W.*, *friction-W.*, or *toothed-W.*; including, under the second division, *band-W.*, and under the third the various kinds of *cog, trundle, spur, crown*, and *bevelled W.*

The efficiency of a carriage *W.* consists in the length of the lever it offers (or, in other words, upon its diameter); upon the direction in which the power is applied to it; and upon the small extent of surface producing friction, provided that the surface be sufficient to prevent the load from forcing the *W.* into the material on which they run. *Friction-W.* are introduced into mill-work for the purpose of facilitating the horizontal or vertical movement of traversing beds, of guide-rods, etc.; and the conditions they are required to fulfil are, that they should revolve freely on their own axles, and present smooth surfaces (able to retain a lubricating fluid) to the bodies moving over them, or over which they may move. *Driving-band-W.*, on the contrary, are fixed on their bearing-shafts, and have their surfaces formed in such a manner as to cause the bands, or straps, to adhere to them by their mere friction upon the asperities, and thus to produce motion in the secondary band-*W.* of the machinery to which they are applied by the rotation of the first *W.* In *toothed-W.*, a series of projections, or teeth, are formed on the outer rim of one *W.*, which work into corresponding projections upon the outer rim of the *W.* connected with it, in such a manner as to allow the former to communicate their motion by the sliding or rubbing of their surfaces upon the surfaces of the teeth of the second *W.* *Cog-W.* are those in which the teeth are made of a different material to the *W.* itself; but the cogs are nevertheless of the same outline in principle as ordinary teeth.

Wheelbarrow, a small hand-carriage for loads, with handles for supporting it, and moving on one wheel.

Wheeling. See West Virginia.

Wheelwright, a maker or repairer of wheels and wheel-carriages.

Whelp, the young of a dog. — An appliance to a windlass to prevent fleeting and surging.

Wherry, a waterman's light river-boat; a ferry-boat in a harbor.

Whetstone. See Hone.

Whey, the watery part or serum of milk; that portion which remains after making curds, chiefly consisting of water holding between 3 or 4 per cent of sugar of milk in solution. As a diluent and beverage, both in sickness and in health, whey forms one of the best and most wholesome drinks that can be taken.

Whin, a windlass or large capstan for raising ores, etc., from a mine-shaft, usually worked by horse-power.

Whip, a small lift-purchase made by a rope rove through a single block. — A tied-up flag used for signalizing. — A lash secured to a stick for driving with. Cart-whips have a very long lash. Small twisted whalebone whips, etc., are made for ladies.

Whip and Thong Maker, a manufacturer of whips of different kinds which are sold by saddlers and harness makers.

Whip-Cord, fine, double-twisted strong cord, used for whip-lashes and other purposes.

Whip-Lash, twisted hide, bark, or cord fastened to the thong of a whip.

Whipple-Tree, Whiffle-Tree, a swing-bar to which traces are fastened.

Whip-Top, a child's top driven round with a lash.

Whip-Stick, the stock or handle for a driving-whip; these are made of various woods, according to the purpose intended.

Whirlabout, a round-about for children at fairs, with small carriages or wooden horses.

Whirligig, a toy spun round by children.

Whirtle, a perforated steel plate through which pipe or wire is drawn to reduce its diameter.

Whisk, a wisp or broom of rice-stalks; a cook's wire instrument for beating up the whites of eggs, etc. — A cooper's plane.

Whisker, projecting booms at the bows of a ship, to spread the guys of the jib-boom.

Whiskers, the hair growing on a man's cheeks; these are made and sold for play-actors, masqueraders, and others.

Whisket, a scuttle or basket.

Whiskey [a corruption of the Irish word *usquebaugh*], a spirit obtained from corn, potatoes, roots, sugar, or molasses, though generally from corn. It is the *national spirit*, if we may so term it, of Scotland and Ireland, where it is mostly made from malt; but that distilled in the former is generally reckoned superior to that of the latter. *W.* is also the chief distilled liquor made in the U. States, chiefly from corn or rye. Its flavor differs with the kind of grain or other material from which it is manufactured, and depends upon some natural principles contained in them, as well as upon products which are the result of fermentation, the principal among which is fusel oil. The best quality of rye *W.* from Pennsylvania known as *Monongahela*, and from Bourbon county, Ky,, called *Bourbon W.*, brings a high price. When *W.* is at 60° or upwards, it is called *high-wines*, or simply spirit; when raised to 70° or more by redistillation, it is called *Cologne spirit*, and, when stronger, *alcohol*. The term *W.* is usually restricted to the first distillation, which contains more or less fusel oil; it is, however, frequently made by reducing alcohol and Cologne spirit and adding flavoring extracts. The statistics of production of *W.* in the U. States and the Internal Revenue tax are given under the general head Spirits, while we refer to *Alcohol* for the customs duty on imports. We complete our information on the subject with the following statement, showing the quantities of grain and other materials used for the production of distilled spirits during the year 1879: —

Materials used.	Quantities in bushels.
Corn	11,074,366
Rye	2,156,832
Malt	1,027,886
Mill-feed	277,607
Oats	84,231
Barley	55,612
Wheat	3,947
Other Materials	71
Total	14,680,552
Molasses, gallons	1,995,645

Whistle, a shrill-toned instrument producing, when blown through with the breath, a sound resembling that made by the passage of breath through the contracted or compressed lips. They are used as alarms and for signalling.

Whist-Markers, small coins or medals used for counting or scoring the points of the game of whist.

White, a painter's negative color; the color of pure snow; ceruse. — The albumen of an egg.

White Copper. See German Silver.

White Crops, grain and seed crops as distinguished from green crops, or those cultivated for their roots or herbage.

White Fish, a delicious fish of the salmon family, the *Coregonus albus*, only found in North America, chiefly in the great lakes from Lake Erie to the Arctic sea. It is bluish-gray on the back, lighter on the sides, and white below. Its flesh is bluish-white, changing when boiled to pure white, whence the name. It is from 1½ to 2½ ft. in length, and weighs from 3 to 10 lbs., becoming particularly very large and fat in the clear waters of Lake Superior.

White Goods, a commercial name given to a numerous variety of British, French, and Swiss goods, embracing jaconets, cambrics, nainsooks, mulls, lawns, brilliantes, India twills, dimities, skirtings, dress linings, quilts, piqués, Swiss muslins, French organdies, tarlatanes, percales, madopolans, etc.

White-Lead, one of the most important substances known in house-painting, the *carbonate of lead*, prepared from metallic lead, largely manufactured in England and the U. States, and used as a base for oil paints. It is sold dry and in oil, and is commercially classed with paints. As ordinarily found in commerce, it is adulterated with sulphate of barytes. *Imp.* duty: dry or ground in oil, 3 cts. per lb.

Manuf. — Pieces of cast-lead are placed in earthen pots with a little acetic acid. The pots are arranged in rows in a brick chamber, embedded in spent tan; loose slates, tiles, or boards are placed upon the pots, to support another row; and so on, until the chamber is filled with successive tiers of similar pots, to the extent sometimes of 10,000 or 12,000 pots in all, containing 50 to 60 tons of lead. All the pots of every tier are embedded in tan, or (in France) in stable manure. When the chamber is closed in, the tan ferments; the temperature rises to 150° F.; the acetic acid slowly volatilizes; and the vapor of this acid, mixing with the oxygen of the air, attacks the lead,

and gives rise to many chemical changes. There is first formed an oxide of lead, then a subacetate, and then a carbonate. The tan loses its fermenting power in five or six weeks; the stack or heap is opened, and the pieces of lead are removed from the pots; they still retain their shape, but are increased in bulk, and are through most of their substance changed into dense white carbonate. The carbonate is crushed and broken into powder by passing the plates through rollers; it is ground up with water, and reduced by roasting and drying to a fine white impalpable powder, which constitutes *dry white-lead*. When this substance is to be used for house-painting, it is mixed in a vat with linseed oil, by means of a mechanical stirrer, to the consistence of a stiff paste; 8 lbs. of oil being added to 1 cwt. of white-lead. It is finally ground under a millstone and packed in casks. Other modes of making white-lead are adopted, in which the carbonate is obtained from different salts of the metal; but the one we have described is the process mostly adopted for large manufacturing operations. White-lead, in its grinding and using, is very injurious to the health of the workmen; and many attempts have been made to introduce *zinc white* instead, but without much success. Various kinds of white powder or pigment, known as *ceruse*, *Clichy white*, *Venice white*, *Hamburg white*, *Dutch white*, *Kremnitz white*, and *silver white*, are either very pure white-lead, or a combination of it with sulphate of baryta.

White-Leather, buff leather; alumed leather. See Chamois-Leather, and Wash-Leather.

White-Lime, whitewash for cleansing or coloring walls, etc.

White-Meat, a term applied to young or delicate flesh food, as veal, poultry, rabbits, pork, etc.

Whitener, a name for a colorer or whitewasher.

Whitening-Stone, a sharpening and polishing stone employed by cutlers; a name for a finishing grindstone of a finer texture than the common large ordinary sandstones.

Whites, a miller's name for the finest flour made from white wheat.

White Satin, pure, undyed satin, much used for bridal dresses, and lady's slips or under petticoats.

Whitewash is simply water in which slacked lime is dissolved. The solidity of the white produced depends on the proportion of lime used; and when employed as a white coating for walls and ceilings (not merely a disinfectant), a little melted size is added.

Whiting [Fr. *blanc d'Espagne;* Ger. *Spanische Kreide;* It. *biancastro;* Sp. *blanco de España*], used in making putty and other substances employed in the arts, consists of chalk ground under water, and washed to remove sand, etc. It is a remarkably soft and smooth substance, almost wholly free from gritty particles. *Imp.* duty: dry, 1 ct. per lb.; ground in oil, 2 cts. per lb.

Whitney Rifle. See Gun.

Whorler, a potter's wooden wheel by which a rotatory motion is given to plates and other flat vessels.

Whortleberry, Whurt, a name for the fruit of species of *Vaccinium*, the blue, black, or red berries of which are acid, and eatable. Some are known under the name of bilberries and cow-berries.

Wick, a number of threads of cotton or other spongy substance loosely twisted into a string, plaited or parallel, which by capillary action draws up the oil in lamps, or the melted tallow or wax in candles, in small successive portions to be burned. *Imp.* duty: wicks and wicking cotton, 35 per cent.

Wicker, a small grown twig or osier; a basket-rod.

Wicker-Basket, a basket formed of osiers. They are sometimes made lined with tin, for knives and plates.

Wicker-Work, a texture of osiers; baskets.

Wicket, a small gate; a row of stumps to be bowled at, at cricket.

Wide-Awake, a low-crowned felt-hat.

Widow's-Weeds, the mourning attire for a female who has lost her husband.

Wig, an artificial covering of hair for the head. There are various kinds of wigs made, as horse-hair wigs for judges and barristers in England; gentlemen's and ladies' wigs of human hair; play-actors' wigs, etc. For *imp.* duty, see Hair.

Wig-Block, a shaped piece of wood for fitting a wig on.

Wigte, the Dutch name for the French gramme, which is equal to nearly 15½ grains, viz., 15.4339.

Wild-Fowl, a trade name for wild ducks and other birds obtained in winter, in decoys, or by shooting.

Wilhelmshaven. See Germany.

Will, a testamentary document giving instructions as to the disposal of a person's property and effects after death.

Williamsburg City Fire-Insurance Co., located in Brooklyn, N. Y., organized in 1853. *Statement*, Jan. 1, 1880: Cap. paid up in cash, $250,000; net surplus, $443,695. Risks in force, $60,549,890; premiums, $421,359. Premiums received since the organization of the Co., $5,974,734; losses paid, $3,150,280; cash dividends paid to stockholders, $652,500.

Willowing-Machine, a set of revolving bars for removing the pith and other refuse from flax, hemp, etc.

Willow-Ware includes a variety of articles made from the branches of the willow or osier, such as baskets, wicker-work, chair bottoms, cradles, etc.

Willying-Machine, a revolving cylinder, armed with teeth to open matted wool, and free it from dust. It is also called the shake-willy and the twilly.

Wilton-Carpet, a name for Brussel carpets with the yarn cut, which gives the face an elastic, velvety pile.

Wimble, a brace; a bit; a carpenter's boring instrument turned by the handle; a gimlet.

Wilmington. See Delaware and South Carolina.

Wilmington and Weldon R. R. runs from Wilmington to Weldon, N. C., 163.5 m.; branch, 17 m.; total length of road, 180.5. This Co., located at Wilmington, was chartered in 1835, and the road was opened in 1840. Cap. stock, $1,456,200; funded debt, $1,619,100. Cost of construction and equipment, $3,340,365.

Wimple, a hood or veil. — The winding on a river.

Wincey, another name for linsey-woolsey.

Winch, the simplest form of hoisting-machine, consisting of a roller on which the rope is wound, the turning power being a crank.

Winchester Bushel. See Bushel.

Winder, a reel for winding silk or cotton on.

Wind-Gauge, an anemometer.

Winding-Engine, an engine for drawing up buckets, etc., from a well or shaft.

Winding-Machine, a twisting or warping machine.

Windlass, a circular axis or revolving machine, moved by crank handles.

Wind-Mill. Although the vast extension in the use of steam-engines has lessened the employment of *W.*, they will always be advantageous under certain circumstances, especially when fuel is dear or difficult to obtain. A *W.* consists essentially of a wooden structure that will rotate on a vertical axis, and having wings or vanes that will revolve in common on a nearly horizontal axis.

The wind, acting on the vanes, causes them to rotate; and this rotation can easily be made to work millstones or any other rotating mechanism, while the movement of the whole building round its axis enables the vanes to be presented at the proper angle to receive the impact of the wind. Each vane is about 40 ft. long, and consists of a sail-frame or skeleton with stretchers and strengtheners of wood, and a covering of sail-cloth. In some *W.* the vanes are adjusted to meet the wind by ropes and a windlass below; but in the better kind a sort of weathercock on a subsidiary vane is so adjusted as to allow the wind to do the work. Numerous mechanical contrivances are adopted to check the velocity of the vanes, stop them altogether, etc., but the principle of all *W.* is really very simple. In some special circumstances *horizontal W.* are used, the vanes revolving around a vertical axis.

Window-Blind, a calico or brown holland roller-blind.

Window-Frame, the wood-work or iron frame or partition for enclosing the panes of glass.

Window-Glass. See GLASS.

Window-Shades, rolling or projecting blinds or sun-shades, sometimes transparent or painted, at other times canvas on spring-rollers.

Wind-Sail, a tube of canvas passed down a skylight or hatchway, to ventilate a ship. — The canvas sail or vane of a wind-mill.

Windsor-Chair, a kind of strong, plain, polished wooden chair.

Windsor Soap, a scented soap, well known in all countries for its excellence both as a washing and shaving soap. It is made of mutton suet and lard, or olive-oil, and is either brown or white. The fancy varieties are produced by adding violet, rose, benzoin, palm, or other essential oils. It originated in England, but is also largely manuf. in France. An inferior quality of it is made in this country.

Wine [Fr. *vin;* Ger. *Wein;* It. and Sp. *vino;* Port. *vinho;* Latin *vinum*], the fermented juice of the grape, or berries of the vine, *Vitis vinifera.* The vine is indigenous to Persia and the Levant; but it is now found in most temperate regions. The limits within which it is cultivated in the N. hemisphere of the Old World vary from about 15° to 48° and 52°; but in N. America it is not cultivated farther N. than 38° or 40°. It is rarely grown at a greater altitude than 3,000 ft. From Asia the vine was introduced into Greece, and thence into Italy. The Phocians, who founded Marseilles, carried the vine to the S. of France. The vine grows in every sort of soil; but that which is light and gravelly seems best suited for the production of fine wines. It succeeds extremely well in volcanic countries. The best wines of Italy are produced in the neighborhood of Vesuvius; the famous Tokay wine is also made in a volcanic district, as are several of the best French wines; many parts of the S. of France bearing evident marks of extinct volcanoes. Hermitage is grown among the debris of granite rocks. The most favorable situation for a vineyard is upon a rising ground or hill facing the S. E., and the situation should not be too confined;

— apertos
Bacchus amat colles.

The art of expressing and fermenting the juice of the grape appears to have been practised from the remotest antiquity. The sacred writings tell us that Noah planted a vineyard soon after the deluge (Gen. ix. 20); and a modern Latin poet ingeniously represents the vine as a gift from Heaven, to console mankind for the miseries entailed upon them by that grand catastrophe.

> Omnia vastatis ergo quum cerneret arvis
> Desolata Deus, nobis felicia vini
> Dona dedit; tristes hominum quo munere fovit
> Reliquias, mundi solatus vite ruinam!
>
> Vanicrii *Prœd. Rusticum*, lib. xi.

Species of vine. — There are many varieties of vines; and this circumstance, combined with differences of soil, climate, mode of preparation, etc., occasions an extreme variety in the species of wine. But between places immediately contiguous to each other, and where even a careful observer would hardly remark any difference, the qualities of the wines, though produced by the same species of grape, and treated in the same way, are often very different. A great deal evidently depends upon the aspect of the vineyard; and it is probable that a good deal depends on peculiarities of soil. But whatever may be the cause, it is certain that there are wines raised in a few limited districts, such as Tokay, Johannisberger, Constantia, the best Burgundy, Champagne, Claret, etc., that no art or care has hitherto succeeded in producing of equal goodness in other places.—The leading character of wine must be referred to the alcohol which it contains, and upon which its intoxicating powers principally depend; not exclusively, however; for some of the lighter wines, if brisk and effervescent, seem to derive from the admixture of carbonic acid a peculiar exhilarating power not directly proportional to their alcoholic contents. And again we find other wines, among which certain Burgundies stand foremost, which are eminently heating, though not very strong. The following table shows the quantity of alcohol (of the sp. gr. of 8.25 at 60°), by measure, contained in 100 parts by measure of the respective wines. Some other vinous and spirituous liquors have been added, for the purpose of showing the relation which they bear to wine in the proportion of alcohol which they contain: —

PROPORTION OF SPIRIT PER CENT.

	By Measure.	Average.
1. Lissa	26.47	
"	24.35	
"	15.90	
		25.41
2. Raisin wine	26.40	
" "	25.77	
" "	23.20	
		25.12
3. Marsala	26.03	
"	25.05	
"	18.40	
		25.09
4. Port	25.83	
"	24.29	
"	23.71	
"	23.39	
"	22.30	
"	21.40	
"	19.00	
		22.96
5. Madeira	24.42	
"	23.93	
" (Sercial)	21.40	
"	19.20	
		22.27
6. Currant wine	20.55	
7. Sherry	19.81	
"	19.83	
"	18.79	
"	18.25	
" (very old)	23.80	
		19.17
8. Teneriffe	19.79	
9. Colares	19.75	
10. Lachryma Christi	19.70	
11. Constantia	14.50	
" (white)	19.75	
12. " (red)	18.92	
13. Lisbon	18.94	
14. Malaga (1666)	18.94	
15. Bucellas	18.49	
16. Red Madeira	22.30	
" "	18.40	
17. Cape Muschat	18.25	
18. Cape Madeira	22.94	
" "	20.50	
" "	18.11	
19. Stein wine	10.60	
20. Grape wine	18.11	
21. Calcavella	19.20	
"	18.10	
22. Vidonia	19.25	
23. Alba Flora	17.26	
24. Malaga	17.26	
25. White Hermitage	17.43	
26. Rousilion	19.00	
"	17.26	
27. Alcatico	16.20	
28. Ætna	30.00	
29. Claret	17.11	
"	16.32	
"	14.08	
"	12.91	
		15.20
30. Malmsey Madeira	16.40	
31. Lunel	15.52	
32. Sheraaz (red)	15.52	
32. " (white)	19.80	
33. Syracuse	15.28	
34. Sauterne	14.22	
35. Grenache	21.24	
36. Burgundy	16.60	
"	15.22	
"	14.53	
"	11.95	
" (20 years in bottle)	12.16	
		17.84
37. Hock	14.37	
"	13.00	
" (old in cask)	8.88	
		12.08
38. Johannisberger (1788)	8.71	
39. Rudesheimer (1811)	10.72	
40. Rhenish	7.36	
41. Nice	14.36	
42. Barsac	13.86	
43. Tent	13.36	
44 Champagne (still)	13.80	
" (sparkl'g)	12 80	
" (red)	12.56	
" "	11.30	
		12.01
45. Red Hermitage	12.32	
46. Vin de Grave	13.94	
" "	12.80	
47. Frontignan	12.79	
48. Côte Rotie	12.32	
49. Gooseberry wine	11.84	

	By Measure. Average.
50. Orange wine (average of six samples	11.26
51. Tokay	9.88
52. Elder wine	8.79
53. Cider (highest average)	9.87
Cider (lowest average)	5.21
54. Perry (average of four samples)	7.26
55. Mead	7.32
56. Ale (Burton)	8.88
56. Ale (Edinb'rg)	6.20
" (Dorchester)	5.56
57. Brown stout	6.80
58. London porter (average)	4.20
59. London small beer (average)	1.28
60. Brandy	53.39
61. Rum	53.68
62. Gin	51.60
63. Scotch whisk'y	54.32
64. Irish whiskey	53.90

It is necessary, however, to observe that the proportion of alcohol in the same wine varies materially according to the age of the wine and other circumstances, and that wines having the same quantities of alcohol in each may, notwithstanding, differ essentially in every other respect. Practically wines are distinguished by their color, hardness or softness on the palate, their aroma, and their being still or effervescing. In many cases, too, the same variety of wine may be distinguished into a number of sub-varieties, differing more or less in one or more of these particulars. Thus, in the case of Champagne, some varieties are red, and others white or straw-colored; some are dry and others sweet; the aroma of one variety differs from that of another; and, while some are still, others have every different degree of effervescing power. The same variety exists in the case of clarets, and, indeed, of almost every description of wine. The differences in the qualities of wines depend partly on the differences in the vines, but more on the differences of the soil in which they are planted, in the exposure of the vineyards, and in the treatment of the grapes, and the mode of manufacturing the wine. Though the vine grows in every sort of soil, a rising ground, or gently sloping hill facing the S., with a loose, gravelly, or rather volcanic soil, is by far the best situation for a vineyard. It is in such situations that all the finest wines are produced. As a chemical manuf., wine belongs to the same general group as brewing, distilling, and vinegar-making. In all of them vegetable substances undergo *fermentation*, whatever other process may supplement this. As a rule or standard, the fermented juice of the grape is the only true wine; but, chemically speaking, the juice of any other fruit equally deserves the same name; while parsnip, cowslip, beetroot, ginger, and a large number of other roots, flowers, stalks, leaves, etc, yield juices which may also be fermented into a kind of wine. The wine of the grape derives its flavor from a large number of circumstances, — the quality of the soil, the average summer temperature, the humidity or dryness of the climate, the clearness of the sky, the nature of the seed, and the processes of vintage. In some grapes sugar is rich, producing luscious, fruity wines; in others, acids and essences are rich, giving rise to minute variations in flavor. So numerous are the circumstances which affect the making of wine, that a good vintage year may be followed by a very bad one, or a good sherry vintage be coincident with a bad claret vintage, and yet the cause of the diversity be wholly undiscoverable. The juice of ripe grapes contains sugar, gum, gluten, several acids, several salts, and coloring matters; it is no cause for wonder, therefore, that the flavor of the wine should vary almost infinitely according to various quantities of these constituents. The color of wine depends almost wholly on that of the skins or husks, which are usually fermented at the same time as the juices. Air has sometimes the effect of darkening the color of wine, especially white Rhenish and Bordeaux wines. The quality and age of the wood (usually oak) of which a cask is made, will affect not only the color, but the quality of the wine. The *bouquet*, or combined odor and flavor, appears to result from a peculiar volatile acid which is generated during the fermentation; when an artificial bouquet is imparted to an inferior wine by means of flower or herb essences, this must be regarded as a kind of sophistication. The usual mode of making *claret* will sufficiently illustrate vintage operation. The grapes, deprived of the rotten and unripe branches, are put into a vat to the depth of 15 to 20 in.; 2 galls. of brandy are poured on them; then another layer of grapes; then more brandy; and so on, until the cask is full, to the quantity of 30 to 36 tons. This, called the *cuve-mère* or mother-vat, is covered up closely, and allowed to ferment for 3 or 4 weeks. While this is going on, the main portion of the wine is being made by a separate process. The grapes, thrown into large cisterns, are trodden by the naked feet of men; the juice runs out through an aperture into tubs; the juice and the skins together are thrown into great vats to ferment, which they are allowed to do for 10 or 12 days. The wine thus produced is mixed with a certain preparation from the *cuve-mère;* and very careful processes of examining, racking, fining, etc., continued during many months, finish the manuf. of the choice beverage.

All the wines of the world which have a name in the trade or in history are noticed in this work under their own names or under the names of the countries to which they belong. See ALICANTE, BURGUNDY WINES, CANARY WINES, CAPE WINES, CHAMPAGNE, CLARET, FRANCE (WINES OF), GERMANY (WINES OF), ITALIAN WINES, etc. It therefore only remains here to give a short account of our domestic wines.

American Wines. — From the earliest period of the colonization of America the vine appears to have attracted the attention of the settlers, and it is said that as early as 1564 wine was made from the native grape in Florida. The first attempts to establish a regular vineyard date, however, from 1620, and would seem to have been made in Virginia with European vines, the prospects having become sufficiently encouraging in 1630 for the colonists to send for French vine-dressers to tend their plants. The latter were subsequently accused of ruining the vines by their bad treatment, but most likely this was an error, it having since been made evident that European vines cannot be successfully cultivated east of the Rocky Mountains, where the *Phylloxera vastatrix* prevails. It was in vain that William Penn made repeated attempts to acclimatize European vines in Pennsylvania, that the Swiss emigrants — vine-growers from the Lake of Geneva — made similar trials, they having expended ten thousand dollars to no purpose, in vain, in Jessamine County, Kentucky; Pierre Legaud labored in the environs of Philadelphia; and Lakanal, the member of the French Convention, experimented in Tennessee, Ohio, and Alabama, — all their efforts to introduce the Old World vines proved futile. The attempts that were made by Swiss settlers at Vevay, in Indiana, with the indigenous plants, were more successful, and after a time they managed to produce some palatable wine from the Schuylkill muscatel. Toward the latter part of the eighteenth century the Mission Fathers had succeeded in planting vineyards in California. It is known that in 1771 the vine was cultivated there, and the San Gabriel Mission in the county of Los Angeles, some 300 m. S. E. of San Francisco, is said to have possessed the first vineyard. A prevalent belief is, that the vines were from roots or cuttings obtained from either Spain or Mexico; but it is also conjectured that they were some of the wild varieties known to be scattered over the country; while a third theory suggests that, as attempts to make wine from the wild grapes would most likely have proved a failure, the Fathers planted the seeds of raisins which had come from Spain. The culture must have progressed rapidly, if, as stated, there were planted at San Gabriel in a single spring no fewer than 40,000 vines. These mission vines were mainly of two sorts, the one yielding a white grape with a musky flavor, and the other a dark blue fruit. The latter was the favorite, doubtless from its produce bearing some resemblance to the red wines of Old Castile.

From San Gabriel the planting of the vine extended from mission to mission until each owned its patch of vineland. At the time of the arrival of the Americans in 1846 the smallest of these was five acres in extent, and others as many as thirty acres, and it is calculated the average yield was from 700 to 1,000 gallons of wine per acre. This was owing first to the exceeding richness of the soil, and secondly to its being well irrigated. If the celebrated mission vine grown on one of the sunny slopes overlooking the lovely Montecito Valley near Santa Barbara on the blue Pacific had many fellows in the Fathers' vineyards, the above estimate can hardly be an exaggerated one. The stem of this vine, which is four feet four inches in circumference at the ground, rises eight feet before branching out. The branches, under which the country people are fond of dancing, and which are supported by fifty-two trellises, extend over more than 5,000 square feet. This monster vine produces annually from five to six tons of grapes, and one year it yielded no fewer than 7,000 bunches, each from one to four pounds in weight. It is irrigated by water from the hot springs, situated a few miles distant, and is believed to be from half to three quarters of a century old.

Viticulture and vinification languished in the U. States until attention was called in 1826 to the Catawba vine by Major Adlum, of Georgetown, near Washington, who thought that by so doing he was conferring a greater benefit on his country than if he had liquidated its national debt. This vine, which is derived from the wild *Vitis labrusca*, was first planted on an extensive scale by Nicholas Longworth, justly looked upon as one of the founders of American viticulture, and gradually supplanted all others, remaining for many years the principal plant cultivated along the banks of the Ohio, until, ceaselessly attacked by rot, mildew, and leaf-blight, it was found necessary in many places to supplant it by more robust varieties. The wines and wine-grapes of America may be divided into wines of the Atlantic coast and wines of the Pacific coast. They are so entirely distinct that they can hardly be compared. The wines of the first division resemble more those of Germany and France, containing more acid, more sprightliness, flavor, and bouquet; while the wines of the Pacific coast, especially California, contain but little acid, a good deal of spirit, and little flavor or bouquet, thus more nearly resembling the wines of Spain and Southern Europe. The cause of this may be sought partly in the soil, but mostly in climatic influences. It is well known to wine-makers that the grape must contain a certain amount of acid to develop bouquet during fermentation of the must and its transformation into wine; while the heat of the Southern climate develops the largest amount of sugar in the fruit, the acids diminish." — *The Am. Cyclopædia.* Mr. Longworth, about the year 1837, among his numerous experiments in Cincinnati, included that of making sparkling wines from the Catawba, Isabella, and other varieties of grapes, and at present

there are many manufactories of sparkling Catawba and other wines in Ohio. On Kelley's Island, Erie County, also in the State of Ohio, a wine company, established in 1866, and trading principally in still wines, makes sparkling wines upon a considerable scale exclusively from the Catawba variety of grape, which is cultivated in its highest perfection both on the islands of Lake Erie and along a narrow slip of territory not two miles long bordering the southern shore of the lake, and also in the vicinity of Lake Keuka, near Hammondsport, N. Y. The Kelley Island Wine Company, as it is styled, presses the grapes between the middle of October and the end of November, and bottles from about the 20th May until the commencement of July in the year following. Its brands are Island Queen, Nonpareil, and Carte Blanche. Ninety-five per cent of the wines are dry, and the tendency of the market is in favor of a still drier article. Shipments are principally confined to the U. States, the great centre of the trade being St. Louis, on the Mississippi, which has its own sparkling wine establishments. The company keep some 100,000 bottles of sparkling wines in stock, and possess facilities for bottling five times that quantity whenever the demand might warrant such a step being taken. At Hammondsport, S. of Lake Keuka, — in other words, Crooked Lake, — and in the State of New York, the establishments of the Pleasant Valley and Urbana Wine Companies, devote their attention to both still and sparkling wines, and their products now rival the best qualities of common French wines. The vines of the Catawba and Isabella varieties were first planted in that region for the purpose of making wine in 1854. At the present time there are about 8,000 acres under cultivation with all the better species of vines. The produce from black and white grapes is mingled for the sparkling wines of the district. Of the former but two kinds are considered suitable, the Concord and the Isabella, both being varieties of the indigenous *labrusca*, or so-called foxy-flavored grape. The Concord is a hardy and productive plant, producing large and compact bunches of large round sweet grapes, yielding a wine of the obnoxious foxy flavor. The Isabella is an equally hardy and productive variety, and its bunches are of good size, although not compact. Its berries, too, are large, oval, and juicy, and marked by a strong musky aroma. Of the white, or rather pale-colored grapes — for their hue is usually a reddish one — used for sparkling wines, the principal is the Catawba, also of the *labrusca* variety. The branches are large and tolerably compact; the berries, too, are above the medium size, and have a rich vinous and pronounced musky flavor. Other so-called white species of grapes are the Diana and the Iona, both of them seedlings of the Catawba; the Delaware, the bunches of which are rather small but compact, the berries round, extremely juicy and fresh-tasting, but sweet and aromatic, the wine produced from which is noted for its fragrant bouquet; and, lastly, the Walter, a variety obtained by crossing the Delaware with the Diana. The bunches and berries of the Walter are of medium size; the flavor, like that of the Delaware, is sweet and aromatic; and the grape is, moreover, remarkable for its agreeable bouquet. The vintage usually commences about the end of September or the commencement of October, and the grapes, after being carefully sorted, are run through a small mill, which breaks the skins, and admits of the juice running the more readily out when the fruit is placed beneath the press. The latter is worked with a metal screw, and the must is conducted through pipes or hose to casks holding from two to four thousand gallons each, in which it ferments. During the following May the wine is carefully blended, and the operation of bottling commences and lasts for about two or three months. The newly bottled wine is at first stored in a warm place in order to start the fermentation again, and when the bottles commence to burst it is removed to the subterranean vaults, where it remains stacked in a horizontal fashion until the time arrives to force the sediment down upon the corks. This is accomplished precisely as in the Champagne, the subsequent disgorging and liqueuring being also effected according to the orthodox French system. Altogether a couple of years elapse between the epoch of bottling and shipment, and during this interval each bottle is handled upwards of two hundred times.

The Pleasant Valley Wine Company, established in 1860 for the commerce of still wines, in which it continues to do an extensive business, commenced five years later to make sparkling wines. It grows its own grapes and consumes annually about 1,500 tons of fruit, bottling from 200,000 to 300,000 bottles of sparkling wine in the course of the year. Its brands are the Great Western, of which there is a dry and an extra dry variety, the Carte Blanche and the Pleasant Valley. Even the extra dry variety of the first-named wine tastes sweet in comparison with a moderately dry champagne, in addition to which its flavor, though agreeable, is certainly too pronounced for a sparkling wine of high quality. The wines, which secured a medal for progress at the Vienna Exhibition of 1873, are sold in every city in the U. States, and the company also does a small but increasing trade with England and South America. The Urbana Wine Company, also established at Hammondsport at the same epoch as its rival, deals, like the latter, in still wines as well. It has three brands, — the Gold Seal, of which there is an extra dry variety, the Imperial, and the Royal Rose. At Vienna a diploma of merit was awarded to these wines, for which a considerable market is found throughout the U. States and in the West Indies and South America. The Urbana Wine Company produces excellent sparkling wines of singular lightness and of delicate though distinctive flavor. In our judgment the drier varieties are greatly to be preferred. The prices of all the American sparkling wines are certainly high, being almost equivalent to the price of first-class champagnes taken at Rheims and Epernay. In California the manufacture of sparkling wines is carried on with considerable success, and at the Vienna Exhibition the Buena Vista Vinicultural Society of San Francisco was awarded a medal for progress for the excellent samples it sent there. The society was originally organized by Colonel Haraszthy, the pioneer in recent times of Californian viticulture. It commenced manufacturing sparkling wines with the assistance of experienced workmen from Epernay and Ay; but the endeavors, extending over some three or four years, were attended with but indifferent success, very few *cuvées* proving of fair quality, whilst with the majority the wine had to be emptied from the bottles and distilled into brandy. The son of Colonel Haraszthy subsequently succeeded, in conjunction with Mr. Isidor Landsberger, of San Francisco, in dicovering the cause of these failures, and for ten years past the wine has been constantly improving in quality, owing to the increased use of foreign grapes, which yield a *vin brut* with a delicate bouquet and flavor approaching in character to the finer champagnes. The wine is perfectly pure, no flavoring extracts or spirit being employed in the composition of the liqueur, which is composed merely of sugar-candy dissolved in fine old wine. A French connoisseur pronounces sparkling Sonoma to be the best of American sparkling wines, "clean and fresh-tasting, with the flavor of a middle-class Ay growth, as well as remarkably light and delicate, and possessed of considerable effervescence." The Sonoma Valley vineyards produce the lightest wines of all the Californian growths, some of the white varieties indicating merely 15° of proof spirit, and the red ones no more than 17½°.

The vintage takes place towards the end of October, and the grapes are gathered by Chinamen, who will each pick his 12 cwt. to 14 cwt. of grapes a day for the wages of a dollar. Light wooden boxes are used for holding the grapes, which are stripped from their stalks on their arrival at the press-house, and then partially crushed by a couple of revolving rollers. An inclined platform beneath receives them, and after the expressed juice has been run off into casks they are removed to the press, and the must subsequently extracted is added to that forced out by the rollers. When white wine is being made from black grapes the pressure is less continuous, and the must is of course separated at once from the skins. The fermentation, which is violent for some ten or twelve hours, ceases in about a fortnight, providing a temperature of from 70° to 75° F. is maintained in the vaults. The wine is racked at the new year, and again before the blending and bottling of it in the spring.

The Californian sparkling wines not only find a market in the Eastern States, but are sent across the Pacific to the Sandwich Islands, Japan, China, and even to wine-producing Australia, which has not yet succeeded in producing sparkling wines of its own.

The manufacture of spurious sparkling wines is carried on to some extent in the U. States. The raw wine is cleared by fining it with albumen or gelatine and with alum; the latter substance imparting to it great brilliancy. After being dosed with a flavored sirup the wine is charged like soda-water with carbonic acid gas by placing the bottles under a fountain, and as this gas is derived from marble dust and sulphuric acid, it is liable to be impregnated with both lead and copper, which have the effect of disorganizing alike the wine and the consumers of it, — nausea, headache, and other ills resulting from drinking sparkling wines made under such conditions. — "It is difficult," says the writer of the Art. "American Wines" in the Am. Cyclopædia, "to give even an approximate statement of the amount of the wine interest in the U. States. There are hardly any trustworthy statistics to be gathered, as the manufacture is spread over so vast a territory, of which many portions are yet but thinly inhabited. The following statistics are mostly derived from private sources, and should only be taken as approximate: —

	Gals.		Gals.
California	5,000,000	Wisconsin	25,000
Ohio	3,500,000	Maryland	25,000
New York	3,000,000	South Carolina	25,000
Missouri	2,500,000	Alabama	20,000
Illinois	2,500,000	Connecticut	20,000
Pennsylvania	2,000,000	Mississippi	15,000
Iowa	400,000	Tennessee	15,000
Kentucky	300,000	Arkansas	15,000
Kansas	200,000	Georgia	15,000
Indiana	150,000	Louisiana	10,000
North Carolina	40,000	Delaware	5,000
Michigan	40,000	Dist. of Columbia	5,000
West Virginia	35,000	Massachusetts	5,000
Virginia	30,000	Nebraska	5,000
Texas	30,000	Oregon	5,000
New Mexico	30,000	Washington Ter.	5,000
New Jersey	25,000	Other States and Ter.	5,000
Total			20,000,000

"Of this amount 5,040,000 gallons would come from the Pacific and 14,060,000 from the Atlantic coast. The varieties of the Atlantic States, and their approximate value from the producer to the dealer, may be estimated as follows: —

	Gallons.	Price.	Value.
Catawba............	6,000,000	$0 75	$4,500,000
Concord............	4,000,000	0 50	2,000,000
Norton's Virginia....	1,000,000	1 00	1,000,000
Delaware............	1,000,000	1 25	1,250,000
Clinton..............	1,000,000	0 75	750,000
Isabella............	500,000	0 50	250,000
Ives................	500,000	0 75	375,000
Herbemont..........	250,000	1 25	312,500
Scuppernong.........	100,000	1 00	100,000
Other varieties........	610,000	1 00	610,000
Total........	14,060,000	....	$11,147,500

"To this may be added: —
For grapes consumed..............................$5,000,000
For grape vines and grape wood.................. 5,000,000
For brandy distilled from grapes, husks, and lees... 1,000,000

Total product of vineyards of the Atlantic States..$22,147,500

"If the fact is taken into account that grape culture has really assumed importance only within the last 15 years, it may safely be predicted that it will be trebled within the next 25 years, and become a vast source of national wealth."

Imports. — The value of imports of wines into the U. States for the 10 years from 1870 to 1879, was as follows: —

Years.	In casks.	In bottles.
1870............................	3,216,996	2,586,361
1871............................	3,228,177	2,545,146
1872............................	3,290,439	2,754,035
1873............................	3,584,766	2,866,982
1874............................	3,156,979	2,887,109
1875............................	2,842,622	2,708,652
1876............................	2,084,385	2,669,725
1877............................	1,889,871	2,236,889
1878............................	1,838,891	2,123,254
1879............................	2,054,700	2,284,833

From this statement it appears that in ten years the growth of our domestic wines had influenced the importation of wines in casks (generally common wines) by about 35 per cent, while during the same period the importation of wine in bottles (mostly choice French wines) had not sensibly varied. For the year 1879, the value of imports from France was: wines in casks, $947,767; in bottles, $1,363,687.

Imp. duty: —
Still wines, in casks.........................40 cents per gal.
" in bottles, per case of 12 bottles containing each not more than 1 quart.......................$1.60 per case.
" per case of 24 bottles containing each not more than 1 pint......$1.60 per case.
[Feb. 1875, *Provided*, that any wines containing more than 24 per cent of alcohol shall be forfeited to the U. States.]
Champagne and other sparkling wines in bottles of ½ pint each or less......$1.50 per dozen.
" and other sparkling wines in bottles of over ½, not over 1 pint...$3 per dozen
" and other sparkling wines in bottles of over 1 pint, not over one quart......................$6 per dozen.
" and other sparkling wines in bottles of over 1 quart each (extra).$2 per gallon.

Wine-Cooler, a stand or utensil for wine-bottles, holding ice, etc., to cool the wine in them.

Wine-Glass, a small drinking glass, of different shapes, for holding wine.

Wine-Grower, a cultivator of grapes; the proprietor of a vineyard.

Wine-Measure. The gallon is the only measure for wine or other liquids in the U. States, though the French litre is also a legal measure. Barrels, hogsheads, pipes, butts, tuns, etc., are terms used in commerce for convenience, as expressing proximate quantities, which on gauging are always reduced to gallons. — *T. McElrath.*

Wine-Press, a screw or roller press for expressing the juice from grapes.

Wine-Rooms, a place where draught or bottled wine can be drunk.

Wine-Strainer, a funnel with a sieve or perforated metal holes for straining wine through.

Wings, side buildings or appendages. — The shifting side scenes of a stage. — Small imitation epaulettes or shoulder-knots.

Winnow, to fan grain and separate the chaff.

Winnowing-Machine, a fanner or blower, which drives off chaff, dust, etc., by means of wind.

The cleansing of wheat from husk and chaff, after threshing, is now effected in a very complete way. In one apparatus, Hornby's *W. M.*, there is a spiked roller working through a grating, and forming a sort of hopper. The wheat, in the rough pulsy state as it comes from the threshing machine, is put into the hopper, and the whole mass becomes separated into "best," "good tail," "whites," "screenings," and "chaff," at the rate of 15 quarters per hour.

Winona and St. Peter R. R. runs from Winona, Minn., to Lake Kampeska, Dak., 327 m. This Co., located in Chicago, was chartered in 1862, and the road was completed in 1874. The road and franchises were conveyed to the Chicago and North-Western Co. in 1867. Cap. stock, $410,030; funded debt, $8,775,000; advances by the C. and N. W. R. R. Co., $1,360,641 — total, $10,545,671, representing cost of road and equipment. This Co. is entitled to a land grant of 6,400 acres per mile of road built and equipped. The lands remaining to the Co. amount to about 700,000 acres in Minnesota, and 400,000 in Dakota.

Wire, a small metallic rod drawn to an even thread, and varying in thickness from an inch to $\frac{1}{5000}$ of an inch.

Wire Drawing. — Wire is a result of the ductility of metals brought into action in a peculiar way. The ancients made their wire by hammering metal into thin sheets, cutting it up into strips, and hammering the strips into wires. The modern method is far more rapid and effective, the metal being shaped into rods by being drawn (in a red-hot state) between grooved rollers, and the rods reduced to wire by being drawn (in a cold state) through holes in a plate of some harder metal. Most rods for wire are about ¼ inch thick, all the subsequent reduction being made by the wire-drawer. The draw-plates are made of hard steel, and are pierced with holes varying by almost insensible degrees in diameter; these holes are mostly round, and are made with very scrupulous care. The rods are drawn through a great number of holes in succession, so as to reduce their thickness gradually. Much mechanical force is required to pull the wire through. This is effected by the aid

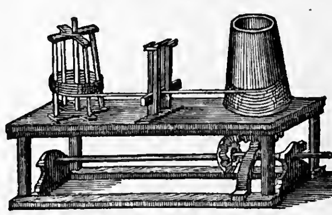

Fig. 494. — Wire-Drawing Bench.

of a draw-bench, drawing-block, revolving-shaft, bevel wheels, forceps, toothed rack, etc. Steam power or water power is employed to rotate the shaft, which is the source of all the other movements. The wire requires frequent annealing, on account of becoming so much hardened by the compression; and a pickling in dilute acid is necessary to remove the film of oxide formed during the annealing. In some cases a lubricating substance is used to facilitate the passage of the wire through the holes in the draw-plate. Most wire is round, being drawn through circular holes; but some kinds are made oval, half round, square, angular, etc., for special purposes. A few of the delicate kinds of wire, such as that for the pendulum springs of chronometers, are drawn through holes pierced in small pieces of ruby; steel not being hard enough for the purpose. Some of the finest wire used in the arts is that which is woven to form the wire gauze of safety lamps; this gauze often has 120 wires each way in an inch, or 14,400 meshes in a square inch.

Wire Ropes. — The material of which ropes shall be formed is a matter for much consideration in shipping, owing to the large quantity required. It used to be considered, in the old days of sailing ships, before the employment of steamers and iron-clads, that a first-rate man-of-war carried no less than 43 m. of cordage, adding up all from the smallest rope to the thickest cable; and as, one with another, these several kinds averaged 2 tons per mile, the weight became somewhat formidable. The largest of the cables, 8 in. diameter and 25 in. in circumference, had no less than 360 yarns in every strand; and, therefore, the weight of hemp consumed in a given length of cable was very great. The price of the fibre being often enormously high in war-time, there was every inducement to substitute iron for hemp, if it could be accomplished. The larger substitutes are described elsewhere (see CABLE, CHAIN); we here treat of *wire ropes*. They were first used in some German mines, about the year 1830. Sometimes straight, untwisted wires are bound together at intervals; sometimes wires are twisted into strands, and strands into larger ropes, on the same principle as hempen ropes, though not with so hard a twist; and sometimes flat ropes are made by joining wire ropes side by side with some kind of hempen or canvas connection. The chief uses of iron-wire ropes are for ships' rigging, mines, wire suspension bridges, and submarine electric cables. The latter is now a very important application. See TELEGRAPH, SUBMARINE. According to careful experiments, it has been found that a 1¼-inch iron-wire rope, weight 20 oz. per fathom, is as strong as a 3-inch hempen rope weighing 36 oz. per fathom, and so on up to great thickness; whence we are told that a 4½-inch wire rope, 15¾ lbs. to the fathom, will bear as great a strain as a 12-inch hempen rope of 36½ lbs. to the fathom. Wire ropes are made, though much less extensively, of steel, copper, brass, and other metals.

In the following table of weights of wrought-iron, steel, copper, and brass wire, the diameters and thickness are given according to the American gauge of Brown, Sharp, & Co.: —

No. of Gage.	Size of each No.	Weight of wire per 1,000 lineal Feet.			
		Wrought-Iron.	Steel.	Copper.	Brass.
	Inch.	Lbs.	Lbs.	Lbs.	Lbs.
0000	.46000	560.74	566.03	640.51	605.18
000	.40964	444.68	448.88	507.95	479.91
00	.36480	352.66	355.99	402.83	380.67
0	.32486	279.67	282 30	319.45	301.82
1	.28930	221.79	223.89	253.34	239.35
2	.25763	175.89	177.55	200.91	189.82
3	.22942	139.48	140.80	159.32	150.52
4	.20431	110.62	111.66	126.35	119.38
5	.18194	87.720	88.548	100.20	94.666
6	.16202	69.565	70.221	79.462	75.075
7	.14428	55.165	55.685	63.013	59.545
8	.12849	43.751	44 164	49.976	47.219
9	.11443	34.699	35.026	39.636	37.437
10	.10189	27.512	27.772	31.426	29.687
11	.090742	21.820	22.026	24.924	23.549
12	.080808	17.304	17.468	19.766	18.676
13	.071961	13.722	13.851	15.674	14.809
14	.064034	10.886	10.989	12.435	11.746
15	.057068	8.631	8.712	9.859	9.315
16	.050820	6.845	6.909	7.819	7.587
17	.045257	5.427	5.478	6.199	5.857
18	.040303	4.304	4.344	4.916	4.645
19	.035890	3.413	3.445	3.899	3.684
20	.031961	2.708	2.734	3.094	2.920
21	.028462	2.147	2.167	2.452	2.317
22	.025347	1.703	1.719	1.945	1.838
23	.022571	1.350	1.363	1.542	1.457
24	.020100	1.071	1.081	1.223	1.155
25	.017900	.8491	.8571	.9699	.9163
26	.015940	.6734	.6797	.7692	.7267
27	.014195	.5340	.5391	.6099	.5763
28	.012641	.4235	.4275	.4837	.4570
29	.011257	.3358	.3389	.3835	.3624
30	.010025	.2663	.2688	.3042	.2874
31	.008928	.2113	.2132	.2413	.2280
32	.007950	.1675	.1691	.1913	.1808
33	.007080	.1328	.1341	.1517	.1434
34	.006304	.1053	.1063	.1204	.1137
35	.005614	.08366	.08445	.0956	.09015
36	.005000	.06625	.06687	.0757	.0715
37	.004453	.05255	.05304	.06003	.05671
38	.003965	.04166	.04205	.04758	.04496
39	.003531	.03305	.03336	.03775	.03566
40	.003144	.02620	.02644	.02992	.02827
Specific gravity....		7.7747	7.847	8.880	8.386
Weight per cubic ft.		485.874	490.45	554.988	524.16

Imp. duty: Wire, binding, for saddlery, rolled or flattened, and other, n. o. p. f., 35 per cent; brass, 35 per cent; copper, 45 per cent; gilt, silvered, or plated, 35 per cent; gold or silver, 40 per cent.; iron (see IRON); steel (see STEEL); telegraph (galvanized iron), 2c. per lb. and 15 per cent.

Wire-Cloth, a twisted or woven substance made of copper, brass, or iron wire, used for flour machines, paper-making machines, kiln-floors, meat-safes, and larders, window-blinds, sieves, etc. The finest wires are made in France, often of sizes nearly as small as human hair.

Wire-Fence, hurdles or fencing of wire to keep out cattle from parks, lawns, or pleasure grounds; and also for shrubberies and vineries, and for training flowers on.

Wire-Gauge, a gauge for measuring the thickness of wire and sheet-metals. It is usually a plate of steel having a series of apertures around its edge, each corresponding in width to the diameter of wire of a certain number.

Wire-Gauze, a texture of fine wire used for window-blinds, sieves, etc. See WIRE-CLOTH.

Wire-Guard, a protection for the front of a fire-grate, to prevent the sparks flying out.

Wire-Iron, black rod iron, used for drawing out into wire.

Wire Meat-Cover, a hollow shape of gauze wire to place over a dish with meat.

Wire-Ribbon Maker, a weaver of bands or lengths of crossed wire.

Wire-Rope. See WIRE.

Wire-Sieve, a bolter or strainer with a wire bottom.

Wire-Thread, the flattened gilt wire with which silk thread is covered.

Wireworker, a manufacturer of articles from wire.

Wisconsin, a N. W. State of the American Union, situated between lat. 42° 30′ 47″ N., and lon. 88° 30′ 92″ W. It is bounded N. by Lake Superior and the State of Michigan, W. by Green Bay and Lake Michigan, S. by Illinois, S.W. by Iowa, and W. by Minnesota. Average length about 260 m., with a breadth of 215. Area, exclusive of water surface, 53,924 sq. m., or 34,511,360 acres. *W.* is divided into 60 counties. The capital, *Madison*, situated in lat. 43° 4′ N., lon. 89° 23′ W., 75 m., of Milwaukee, is surrounded by a fertile country, has an important trade, and contains manuf. of carriages, wagons, furniture, agricultural implements, etc.; pop. 12,000. Milwaukee, the commercial emporium, is separately given below. Among other places of importance are Appleton (pop. 8,000), Chippewa Falls (7,000), Eau Claire (11,000), Fond du Lac (20,000), Green Bay (10,000), Janesville (12,000), La Crosse (14,000), Manitowoc (7,000), Oshkosh (20,000), Portage (5,000), Racine (16,000), Sheboygan (8,000), and Watertown (11,000). Pop. of State, 1,425,000.

The surface of *W.*, nowhere rising into mountains or lofty ranges of hills, may be regarded as one vast undulating plain, in some places broken and picturesque, and in others level. The whole State lies at an altitude of from 600 to 1,500 ft. above sea-level. The divides between the different streams generally attain but a slight elevation above the valleys; and the waters of a lake or marsh are frequently drained in opposite directions, reaching the ocean by widely divergent courses, and at very different points. The highest elevation of surface occurs in the N. section of the State, near the head waters of the Montreal River, where it reaches an altitude of 1,800 ft. above the level of the sea, gradually declining in its W. expansion to 1,100 ft.; at the W. line of the State this elevation forming the divide between the waters flowing into Lake Superior and those emptying into the Mississippi River. The streams S. of this divide flow S., S.E., and S.W. The calcareous cliffs along the E. shore of Green Bay and of Lake Winnebago, extend S. through Dodge Co., and form, in many places, bold escarpments, some of the higher points rising to an altitude of 1,400 ft. above sea-level. A series of still more prominent bluffs range along the banks of the Mississippi River, forming some of the grandest and most picturesque scenery in the country. In the W. part, the principal rivers are the St.

Croix, Black, and Chippewa, and, with the Wisconsin in the centre of the State, have their embouchures in the Mississippi. In the S., Rock River, rising in Lake Horicon, flows in the Illinois line, and, entering that State, also flows into the Mississippi. Fox and Wolf Rivers, in the interior, flow S. and N. respectively; while the Menomonee, constituting 100 m. of the E. border, discharges its waters into Green Bay. The other noticeable streams are the St. Louis, Bois Brulé, Bad, and Montreal, all emptying into Lake Superior; the Peshtigo, Oconto, and Pensaukee, flowing into Green Bay; and the Sheboygan, Manitowoc, and Milwaukee, into Lake Michigan. The streams falling into Lake Superior have the most rapid descent, the beds of those tributary to Lake Michigan and the Mississippi River having more gradual and uniform slopes. Rapids occur in most of the streams, affording immense supplies of water-power. The heads of different rivers are often situated in close proximity to each other, those of the Fox and Wisconsin approaching so near that they have been connected by a short canal at Portage City, through which vessels may pass at high water, thus uniting the great lakes with the Mississippi. The Wisconsin, Chippewa, Wolf, and Black Rivers, are navigable for steamers. Lake Winnebago, S. E. of Green Bay, is the largest sheet of water in the State, being 28 m. in length, and 10 in breadth, covering an area of 212 sq. m.; it is daily navigated between Fond du Lac and Menasha, situated respectively on its N. and S. extremities. The other principal lakes are Pepin, St. Croix, Green, Geneva, Pewangan, Pewaukee, Honion, the Four Lakes, and Kaskoneong. The whole surface is, in fact, studded with beautiful small lakes, more particularly in the region of the St. Croix and Chippewa Rivers. — The winters are cold, but generally uniform; the springs are sometimes backward, the summers short and very warm, the autumns mild and pleasant. Mean annual temperature of the winter 20°, spring and autumn 47°, and summer 72°. In the fall and winter, the prevailing winds are from the W., in summer S. E., and in spring N. E. Snow falls in the N. part of the State before the ground is frozen, protecting the roots of plants from wintry frosts, and accelerating vegetable growth in the spring; while in the S. part some winters pass almost entirely without any snow-fall; and, in other seasons, snow falls to the depth of from 12 to 18 inches, covering the whole surface, and remaining the greater part of the winter. Average annual rain-fall, 31 inches. — Lead ore is the most important mineral product of the State, found chiefly in the counties of Grant, Lafayette, and Iowa; it is mostly the sulphuret (galena), though the carbonate (called white mineral) often occurs. Iron ores are found in great quantities and of easy access at Iron Ridge in Dodge Co., at Ironton in Sauk Co., at the Black River Falls in Jackson Co., and in the Penokee Iron range, in Ashland Co., near Lake Superior. Magnetic ores also occur in the archæan region in the vicinity of the Menomonee River, in the N.E. part of the State. The ore has been smelted only at Iron Ridge, Ironton, and Black River Falls. Native copper is found in limited quantities in the N. part of the State; and copper ores have been discovered in fissures in Iowa and Crawford Counties. Two ores of zinc, associated with the lead, have been smelted at Mineral Point. Limestone suitable for polishing (or marble) has been found; the drift affords clay suitable for the coarser wares and for brick; beds of peat and of shell marl occur in the marshes and beds of ancient lakes. Carnelians and agates are picked up among the pebbles of the lake shores, and are found associated with the trap rocks. — The extensive prairies of N. Illinois reach into S. *W.*, and a line drawn from Racine, on Lake Michigan, in a N. W. direction, will separate the prairie and opening, or sparsely timbered, from that covered with dense forests. The N. part of the State yields vast quantities of timber of the finest quality, and of 60 different varieties, among which are the white and Norway pine, oak, balsam, hemlock, cedar, hickory, ash, elm, poplar, sugar maple, birch, aspen, basswood, tamarack, wild cherry, spruce, black walnut, and butternut. The white and red or Norway pines constitute the basis of the lumber business of the State. The business of cutting, sawing, and transporting the pine lumber from the N. part of the State, into the more open and prairie country at the S., is one of very great magnitude, affording employment for many thousands of men. The soils of *W.* are somewhat varied in character; those in the S., and particularly in the S. E. portion, are very fertile; but in the N. expansion they become thinner and best adapted for grazing. Agriculture is the supreme object of industry, and besides the usual cereals, hay, flax, tobacco, clover, and grasses constitute the principal field crops. Pulse, hops, broom-corn, sorghum, and flax-seed yield, also, their fair quota of the agricultural product of the State. A large area of country is admirably adapted to fruit culture, and all kinds of vegetables grown in the N. latitudes are here produced in abundance and perfection. According to the last census there were in *W.* 11,715,321 acres of land in farms, of which 5,899,343 were improved, 3,437,442 woodland, and 2,378,536 other unimproved land. The total number of farms was 102,904, and the average size 114 acres. The cash value of farms was $300,414,064, and of farming implements and machinery $14,239,364. The total estimated value of farm productions, including betterments and additions to stock, was $78,027,032; value of orchard products, $819,268; of produce of market gardens, $226,665; of forest products, $1,327,618; of animals slaughtered or sold for slaughter, $11,914,643; of all live stock, $45,310,882. The statistics of agricultural products for the year 1879, and the number and value of live-stock for the same year, are given in this work under the name of each of the principal crops and animals. — A large number of busy manufacturing towns have sprung up in this State, favored by the abundant water-power and the cheapness of raw materials. The manufactures of lumber, laths, shingles, staves, headings, furniture, agricultural implements, sash, blinds, doors, wagons, carriages, and wooden-ware of every kind are leading interests, the scantily timbered States southwestward affording a good and convenient market for all such goods. Leather, shoes, saddlery, harnesses, woollen goods, metallic wares, gloves, lime, cement, bricks, etc., are also important articles of manufacture. The hard and excellent pale bricks of Milwaukee are known throughout the country. — *W.* had in 1879, 38 national banks in operation, whose aggregate capital was $3,315,000. In the same year, the public debt of *W.* was absorbed in State funds, and there were no bonds on market. The total valuation of property was $413,102,976. Tax per capita, $0.49. *W.* had in 1879, 2,810 m. of railroad, divided into 24 lines, as follows: —

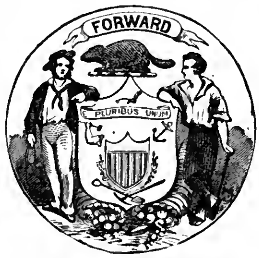

Fig. 495. — SEAL OF WISCONSIN.

Companies.	Total length of line.	Total length in *W.*
	Miles.	Miles.
Chicago, Milwaukee, and St. Paul	1,513.33	683.33
Chicago and North-western	1,199.71	504.19
Chicago, St. Paul, and Minneapolis	177.70	177 70
Chicago and Tomah	30.37	30 37
Chippewa Falls and Western	10.33	10 33
Fond du Lac, Amboy, and Peoria	27.60	27.60
Galena and Southern Wisconsin	31.00	20.00
Green Bay and Minnesota	213 90	213.90
Hudson and River Falls	12.50	12.50
Madison and Portage	39.00	39.00
Milwaukee Cement	1.19	1 19
Milwaukee, Lake Shore, and Western	162.40	162 40
Milwaukee and Northern	129.00	129.00
Mineral Point	51.00	49.00
North-western Union	62.63	62.63
North Wisconsin	62 50	62 50
Oshkosh and Mississippi	20.00	20.00
Pine River Valley and Stevens Point	16.00	16.00
Prairie du Chien and McGregor	2.00	1.75
Sheboygan and Fond du Lac	79.00	79.00
Viroqua	12.00	12 00
Western Union	212.75	85.20
Wisconsin Central	320.50	320.50
Wisconsin Valley	89.90	89.90

Milwaukee, the most important city and port of entry of the State, on the W. shore of Lake Michigan, 85 m. N. by W. of Chicago; lat. 43° 2′ N., lon. 87° 54′ W. An indentation of the lake opposite the city forms a bay 6 m. wide and 3 m. deep, which is easily accessible at all times. The Milwaukee River, which flows through the city, and is joined near its mouth by the Menominee, has been rendered navigable to the heart of the city by vessels of any tonnage used on the lakes. It is regarded as the best harbor on the S. or W. shore of the lake. Milwaukee has easy communication with all parts of the country by means of the Milwaukee and St. Paul, the Western Union, the Chicago and North-western, the Wisconsin Central, and the Milwaukee, Lake Shore, and Western lines. The receipts and shipments by these lines, and by the lake, are of great extent and value, wheat and flour being the most important items. The storage accommodation comprises 6 elevators with a combined capacity of 3,450,000 bushels. Pork-packing is extensively carried on. There are extensive manuf. of lager beer (which is highly esteemed and widely exported), pig-iron, iron castings, flour, leather, malt, machinery, agricultural implements, high-wines, tobacco and cigars, furniture, brooms, paper, woollens, wagons, soap and candles, boots and shoes, steam boilers, car wheels, baskets, trunks, and white-lead. The city has 4 national banks, 4 State banks, 2 savings banks, 4 private banks, 4 fire-insurance Cos., and 1 life-insurance Co. The value of imports from Canada for the year 1879, was $75,220; exports, $1,346,852. The entries in the foreign trade were 65 vessels of 24,008 tons; clearances, 55 vessels of 19,679 tons. In the coastwise trade, 8,458 vessels of 3,749,692 tons

entered, and 8,606 vessels of 3,755,541 tons cleared, the port. The customs district, which includes the entire lake shore of the State, owns 361 vessels of 73,330 tons. Pop. 125,000.

Wisconsin Central R.R. runs from Menasha to Ashland, Wis., 249.30 m.; branch from Stevens Point to Portage City, 71.20 m.; leased line (Milwaukee and Northern R. R.), 129 m.; total length of lines operated, 449.50 m. This Co., located at Milwaukee, was chartered in 1853, and the road was completed in 1876. Cap. stock, $4,000,000; funded debt, $8,168,000 (consisting of 1st mortgage land-grant bonds, 8 per cent). The Co. has a land-grant of over 800,000 acres. The timber, as well as the land, when sold, can only be used for creating a sinking fund for the payment of the bonds or their liquidation.

Wismar. See GERMANY.

Woad, a plant of the mustard family, *Isatis tinctoria*, from the roots and leaves of which a blue dye is obtained; but its use is now almost superseded by indigo.

Wolf, the *Canis occidentalis*, a well-known beast of the dog family. The skins of this animal are made into robes. See FUR.

Wolverine, another name for the glutton, a wild animal, the *Gulo arcticus*, whose skins are used by furriers. See FUR.

Wood [Fr. *bois;* Ger, *Wald, Holz;* It. *legno;* Sp. *madera*], the solid part of the stem and branches of a tree. Trees are divided, as is well known, into two great groups: *exogens* and *endogens.* All the true woods (as they are sometimes termed) are exogens; whereas, the endogens include the grasses, bamboos, palms, etc. In the countries where bamboos and palms are indigenous, they are of great utility, and their uses are very numerous; but of the 400 or 500 varieties of palm-trees known to exist, only a very few are sparingly employed in temperate countries for cabinet and marquetry work, for billiard cues, and for veneers. It is the great class of exogenous plants which furnishes almost all the wood of commerce. The fibres do not appear to differ in size or bulk so much as in density and distance; these two last-named differences give rise to the distinction between hard and soft wood, — the former comprising oak, mahogany, ebony, rose-wood, etc.; and the latter willow, alder, deal, etc. Another classification is that which springs from the direction of the fibres; if the annual or longitudinal fibres be tolerably straight and very little interwoven with the medullary rays or interrupted by knots, the wood becomes elastic and easily rent; such are lance-wood, hickory, ash, etc.; but if the fibres are more crossed and interlaced, the wood becomes less elastic, and more rigid and tough; such are oak, beech, mahogany, etc.; and if the fibres be entangled to a still greater degree, they produce the non-elastic, tough, cross-grained wood, such as elm, lignum-vitæ, etc. Another mode of classification is that which is determined by the beauty of the surface presented by wood. The knots, occasioned by the junction of a branch with the stem; the curls, produced by the confused filling in of the space between the forks or springings of the branches, as in the yew; the gnarled appearance of the roots, formed at the points of junction of the rootlets or arms of the root with the body of the root itself, as in walnut wood; the pollard growths of the oak, and other trees, which owe the beauty of their grain to a crowding together of the little germs that produce the numerous shoots at the top; the ripple-mark surface, occasioned by a serpentine form of the grain, as in satin-wood and sycamore; the bird's-eye pattern, occasioned by a peculiar compression of the grain in isolated spots, as in some kinds of maple; the silver-grain, which results from a marked distinctness in the medullary rays, as in the plane, sycamore, and beech, — all give rise to variations in the appearance of the surface of wood, which are the mainspring of the beauty observable in cabinet work. Another and very obvious mode of classifying wood is in respect to their color, which varies from the almost pure white of holly, to the jet-black of ebony.

Woods are also classified according to the services which they are calculated to render This classification includes nearly 100 species of trees, without naming the varieties of each species. Of these, we give here those which are most generally used: —

Building. — Shipbuilding: cedar, pine (deals), fir, larch, elm, oak, locust, teak. Wet constructions (as piles, foundations, flumes, etc.): elm, alder, beech, oak, plane-tree, white cedar, and palmetto for wharves. House carpentry: pine, oak, whitewood, chestnut, ash, spruce, sycamore.

Machinery and millwork. — Frames: ash, beech, birch, pine, elm, mahogany, oak. Rollers, etc.: box, lignum vitæ, mahogany, service-tree. Teeth of wheels: crab-tree, hornbeam, locust, service-tree. Foundry patterns: alder, pine, mahogany.

Furniture. — Common: beech, birch, cedar, cherry, pine, whitewood. Best furniture: Amboyna, black ebony, cherry, mahogany, maple, oak, rosewood, satin-wood, sandal-wood, chestnut, cedar, tulip-wood, walnut, zebra-wood, ebony.

Of course several kinds of wood find a place in more than one of these groups; but the list is valuable, inasmuch as it brings together before the eye the names of all those woods which resemble each other in some one manufacturing quality In the following list, the best woods of commerce are classified according to the peculiar qualities for which they are thought fit: —

Elasticity. — Ash, hazel, hickory, lance-wood, chestnut (small), snake-wood, yew.

Elasticity and toughness. — Beech, elm, lignum vitæ, oak, walnut, hornbeam.

Even grain (for carving or engraving). — Pear, pine, box, lime-tree.

Durability. — In dry works: cedar, oak, poplar, yellow pine, chestnut Exposed to weather: larch, locust.

Coloring matters. — Red: Brazil, braziletto, camwood, logwood, Nicaragua, red sanders, sapan-wood. Green: green ebony. Yellow: fustic, Zante.

Scent. — Camphor-wood, cedar, rosewood, sandal-wood, satin-wood, sassafras.

All woods are from 7 to 20 times stronger transversely than longitudinally. They become stronger both ways when dry. Some woods decay much more rapidly than others; but they will *all*, in some situations, lose their fibrous texture, and with it their properties. To ascertain the causes which act upon woods, and effect their destruction, is an important object both to the merchant and the builder. All vegetable as well as animal substances, when deprived of life, are subject to decay. If the trunk or branch of a tree be cut horizontally it will be seen that it consists of a series of concentric layers, differing from each other in color and tenacity. In distinct species of trees these layers present very different appearances, but in all cases the outer rings are more porous and softer than the interior. Wood is essentially made up of vessels and cells, and the only solid parts are those coats which form them. These vessels carry the sap which circulates through the tree, gives life and energy to its existence, and is the cause of the formation of leaves, flowers, and fruit. But when the tree is dead, and the sap is still in the wood, it becomes the cause of vegetable decomposition by the process of fermentation. Wood is not equally liable to decay under all circumstances When thoroughly dried it is not so quickly decomposed as when in its green state, for in the latter condition it has in itself all the elements of destruction, and it is scarcely possible to prevent the effect if it be then used in building. But supposing the timber to be perfectly seasoned it is more liable to decay under some circumstances than in others. Timber is most durable when used in very dry places. When timber is constantly exposed to the action of water, the decomposition effected will depend upon the nature and chemical composition of the substance A portion of wood may be soluble in water, but other parts are not; so that after a definite period, the continued action of water upon a piece of timber ceases, and if it can sustain the influence of this cause until that period there is no termination to its endurance, except from those casualties which it might have been able to bear in its original state, but cannot after the removal of that portion of its substance soluble in water. Should a piece of timber that has been for a long time exposed to water be brought into the air and dried, it will become brittle and useless. When wood is alternately exposed to the influence of dryness and moisture it decays rapidly. It appears, from experiments, that after all the matter usually soluble in water has been removed, a fresh maceration and contact of the air produces a state of matter in that which is left which renders it capable of solution. A piece of timber may then in this manner be more and more decomposed until at

last the whole mass is destroyed. The builder is sometimes compelled to use wood in places where it will be exposed to alternate dryness and moisture; fencing, weather boarding, and other works, are thus exposed. In all these cases he may anticipate the destructive process, and provide against it. The wood used in such situations should be thoroughly seasoned, and then painted or tarred; but, if it be painted when not thoroughly seasoned, the destruction will be hastened, for the evaporation of the contained vegetable juices is prevented. There is one other circumstance to be considered, — the influence of moisture associated with heat. Within certain limits the decomposition resulting from moisture increases with the temperature. The access of the air is not absolutely necessary to the carrying on of this process, but water is; and as it goes on, carbonic acid gas and hydrogen gas are given off. The woody fibre itself is not free from this decomposition, for, as the carboniferous matter is abstracted by fermentation, it becomes more susceptible of this change. This statement is proved by the circumstance that when quicklime is added to the moisture the decomposition is accelerated, for it abstracts carbon; but the carbonate of lime produces no such effect; a practical lesson may be learnt from this fact: if timbers be bedded in mortar, decomposition must follow, for it is a long time before it can absorb sufficient carbonic acid to neutralize the effect, and the dampness which is collected by contact with the wet mortar increases the effect. When the wood and the lime are both in a dry state no injury results, and it is well known that lime protects wood from worms. When the destructive process first becomes visible it is by the swelling of the timber, and the formation of a mould or fungus upon its surface. This fungus or cryptogamic plant rapidly increases, and soon covers over the whole surface of a piece of timber, having a white, grayish-white, or brownish hue. When the seeds of destruction are thus once sown they cannot be readily eradicated. Heat and moisture may be considered the prominent causes of the rapid decomposition of vegetable substances. When wood is completely and constantly covered with water this effect is not produced; and we have an example in the fact, that, although those parts of a vessel which are subject to an occasional moisture are liable to dry rot, yet those parts which are constantly beneath the water are not ever thus affected; and although the head of a pile, which may be now and then wetted by the casual rise of the tide, and is then dried again by the sun, may be decomposed, yet those parts which are always covered with water have been found in a solid state after centuries of immersion. Something may be done towards the prevention of decay by felling the timber at a proper season. A tree may be felled too soon or too late, in relation to its age and to the period of the year. A tree may be so young that no part of it shall have the proper degree of hardness, and even its heart-wood may be no better than sap-wood; or a tree may be felled when it is so old that the wood, if not decayed, may have become brittle, losing all the elasticity of maturity. The time required to bring the several kinds of trees to maturity varies according to the nature of the tree and the situation in which it may be growing. Authors differ a century as to the age at which oak should be felled, some say one hundred, and others two hundred years; it must, then, be regulated according to circumstances. But it is also necessary that the timber trees should be felled at a proper season of the year; that is to say, when their vessels are least loaded with those juices which are ready for the production of sap-wood and foliage. The timber of a tree felled in spring or in autumn would be especially liable to decay; for it would contain the element of decomposition. Midsummer and midwinter are the proper times for cutting, as the vegetative powers are then expended. There are some trees, the bark of which is valuable, as well as the timber; and as the best time for felling is not the best for stripping the bark, it is customary to perform these labors at different periods. The oak-bark, for instance, is generally taken off in early spring, and the timber is felled as soon as the foliage is dead; and this method is found to be highly advantageous to the durability of the timber. The sap-wood is hardened, and all the available vegetable juices are expended in the production of foliage. Could this plan be adopted with other trees, it would be desirable; but the barks are not sufficiently valuable to pay the expense of stripping.

Seasoning. — Supposing all these precautions to be taken in felling timber, it is still necessary to season it; that is, to adopt some means by which it may be dried, so as to throw off all the juices which are still associated with the fibres of the wood. As soon as the timber is felled, it should be removed to some dry place; and, being piled in such a manner as to admit a circulation of air, remain in log for some time, as it has a tendency to prevent warping. The next process is to cut the timber into scantlings, and to place these upright in some dry situation, where there is a good current of air, avoiding the direct rays of the sun. The more gradually the process of seasoning is carried on, the better will be the wood for all the purposes of building. Mr. Tredgold says, "It is well known to chemists, that slow drying will render many bodies less easy to dissolve; while rapid drying, on the contrary, renders the same bodies more soluble. Besides, all wood, in drying, loses a portion of its carbon, and the more in proportion as the temperature is higher. There is in wood that has been properly seasoned a toughness and elasticity which is not to be found in rapidly dried wood. This is an evident proof that firm cohesion does not take place when the moisture is dissipated in a high heat. Also, seasoning by heat alone produces a hard crust on the surface, which will scarcely permit the moisture to evaporate from the internal part, and is very injurious to the wood. For the general purposes of carpentry, timber should not be used in less than two years after it is felled; and this is the least time that ought to be allowed for seasoning. For joiners' work it requires four years, unless other methods be used; but for carpentry natural seasoning should have the preference, unless the pressure of the air be removed."

Many artificial methods of seasoning and preserving timber are now in use, but their description is beyond the scope of this work.

Timber and Lumber. — Logs and beams, whether hewn or sawed, are called timber. The term lumber is applied to beams, or to the material sawed into planks and boards. The American price-current quotations under this head include white-pine logs and boards, hemlock joists and boards, yellow-pine boards and timber, white-oak planks and logs, black walnut logs and crotches and planks, bird's-eye-maple logs and boards, spruce-fir boards and logs and deals, ash, sycamore, maple, chestnut, beech, birch, and white-wood boards and planks. Laths, shingles, staves, hoops, etc., are also almost generally included under the head of lumber.

The following table exhibits the amount of sawed lumber which can be produced from logs of specified dimensions: —

Diameter.	Square.	No. ft.
10 inches	7 inches	4
11 do.	7⅞ do.	5
12 do.	8½ do.	6
13 do.	9⅛ do.	7
14 do.	10 do.	8
15 do.	10⅝ do.	9
16 do.	11½ do.	10⅔
17 do.	12 do.	12
18 do.	12⅞ do.	13½
19 do.	13½ do.	15
20 do.	14⅛ do.	16⅔
21 do.	15 do.	18⅓
22 do.	15½ do.	20
23 do.	16¼ do.	22
24 do.	17 do.	24
25 do.	17½ do.	26
26 do.	18¼ do.	28
27 do.	19 do.	30
28 do.	19½ do.	32½
29 do.	20½ do.	35
30 do.	21¼ do.	37½
31 do.	22 do.	40
32 do.	22½ do.	42½
33 do.	23¼ do.	45
34 do.	24 do.	48
35 do.	24¾ do.	51
36 do.	25⅝ do.	53½

The first column is for diameters of logs, from 10 in. to 3 ft. The second column shows the number of inches which each log will square. The third column gives the number of feet, board measure (1 ft. square and 1 in. thick), which each foot in the length of the log will make; thus, a log 10 in. in diameter will square 7 in., and if 1 ft. long it will make 4 ft.; if 10 ft. long, will make 40 ft. of boards. Again, by the table, a log 36 in. in diameter will square 25⅝ in.; if 1 ft. long, will cut 53½ ft. board measure; if 10 ft. long, will contain 525 ft., allowing the usual thickness of saw.

Wood-Working Machines. — Timber, like metal, has in late years undergone vast changes in regard to the mode of working it into useful forms. The hand-worked saw, adze, plane, chisel, gouge, etc., will necessarily remain in use for all smaller operations; but we are every year advancing in the employment of cutting and sharping machines worked by steam power. There are factories now which will turn out doors, window frames, panels, mouldings, and the like, to any extent, and ready for immediate use by the builders. Some of the more useful machines for working in wood are the following: — *Vertical-saw Frame.* This is an assemblage of saws, placed parallel at short distances apart, and in a vertical position. Steam power (or it may be water power) works the frame up and down, and all the saws with it. If a log of timber were to be cut into inch planks, the saws would be fixed an inch apart, and so on. The timber is driven up to the saws, by being fixed on an iron carriage to which motion is given. Some of the machines are large enough to take a log 50 ft. long by 42 in. in diameter. — *Veneer-sawing Frame.* This requires the saws to be very thin, to be made of superior steel, to be placed at very small distances apart, and to be adjusted with rigorous accuracy, otherwise it would be impossible to cut thin veneers without wasting much of the wood, which is often choice and valuable. The sawing action is rotary, not up and down. Each saw consists of several segments of a circle, fastened to a cast-iron disk. — *Circular-saw Bench.* This consists of two op more circular saws, fixed vertically in a bench, the bed or tor

of which receives the piece of timber: the timber is driven towards the saws, which speedily rip it up into parallel strips of pre-arranged width. — *Cross-cut Saw Bench.* The saws and the bench are here so adjusted that cuts are made cross-way of the grain, determining the lengths of pieces of wood with as much nicety as the other saws have determined the width. — *Roller Planing Machine.* This very effective contrivance has a row of rollers by which the wood is guided; while fixed and stationary cutters exert such varied kinds of action as to plane, joint, rebate, tongue, and groove, or any one or more among these processes. — *Moulding Machine* gives all the various forms of ogee, fillet, hollow, and round to the wood, with which we are familiar in wood-mouldings for joinery and picture-frame making. The cutting tools are fixed to revolving blocks, and will cut the wood on one or on both surfaces at once; or they will produce plane smooth surfaces and edges, with or without any mouldings. — *Circular Moulding Machine.* A familiar work

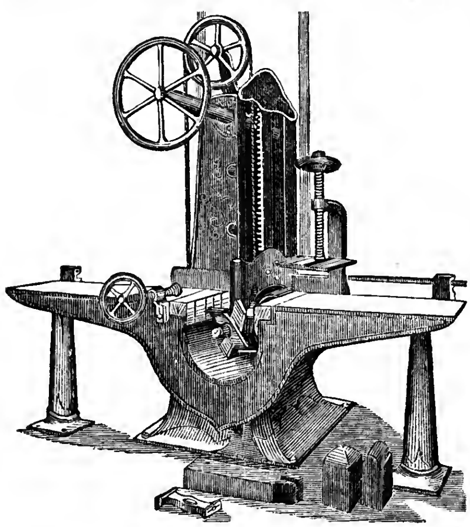

Fig. 496. — Fay's Gap-Bed Tenoning-Machine.

is here performed upon pieces of wood having a curved shape not suitable for treatment by the last-named machine,— such as circular heads for sashes, hand-rails, and table-edges. — *Tenoning Machine.* A tenon being a peculiar projection in the end of one piece of wood to fit into a particular cavity in another, this machine is so adjusted as to give precisely the proper shape and size to the tenon. Fig. 496, a form of tenoning machine used for cutting mortises and tenons on the ends of heavy framing-timbers. — *Vertical Boring Machine* is, as its name denotes, a contrivance for boring or drilling circular holes, as it will make any hole from a fraction of an inch to 3 in. diameter, and from an inch to 16 in. in depth. — *Horizontal Boring Machine* acts nearly in the same manner, but in a different direction. Sometimes a special tool follows the borer, to give a square form to the round hole.

The value of imports of wood and wood manufactures into the U. States for the year 1879 was as follows: —

Unmanufactured wood (chiefly from Canada, the East Indies, Japan, and Mexico)	$1,758,652
Boards, deals, etc., (mostly from Canada)	3,292,042
Other lumber	282,583
Cabinet ware, house furniture, etc	924,464
	$6,257,741

The value of exports for the same year was as follows: —

Boards, deals, planks, etc	$3,972,608
Laths, palings, pickets, etc	13,002
Shingles	176,514
Box-shooks	103,788
Other shooks, staves, and headings	3,666,652
Hogsheads and barrels, empty	248,085
All other timber	680,068
Fire-wood	11,096
Hop, hoop, telegraph lines, etc	466,209
Logs, masts, and other whole timber	613,706
Sawed and hewn timber	1,748,525
All other timber	164,192
Household furniture	1,804,296
Wooden-ware	255,770
All other manuf. of wood	1,699,992
	$15,824,503

Imp. duty: Wood, unmanufactured, n. o. p. f., 20 per cent; in logs and round, unmanufactured timber and ship-timber, n. o. p. f., free; cedar, lignum-vitæ, lance-wood, ebony, box, granavilla, mahogany, and all cabinet, unmanufactured, free; sawed boards, planks, deals, and other lumber of hemlock, white-wood, sycamore, and bass-wood, $1.00 per 1000 ft. board measure; all other varieties of sawed lumber, $2.00 per 1000 ft. board measure. [*Provided*, That when lumber of any sort is planed or finished, in addition to the rates herein provided, there shall be levied and paid for each side so planed or finished, 50 cents per 1000 ft.; and if planed on one side and tongued and grooved, $1.00 per 1000 ft.; and if planed on two sides and tongued and grooved, $1.50 per 1000 ft.] — Poplar and other woods for the manufacture of paper, free; hubs for wheels, posts, last-blocks, and all like blocks or sticks, rough-hewn, or sawn only, 20 per cent; pickets and palings, 20 per cent; laths, 15 cents per 1000 pieces; clapboards (pine), $2.00 per 1000; clapboards (spruce), $1.50 per 1000; manufactures of wood, or of which wood is the chief component part, n. o. p. f., 35 per cent; timber used in building wharves, 20 per cent.

Wood-Acid, an inferior pyroligneous acid, distilled from oak, beech, ash, etc., and used by calico-printers as a substitute for the higher-priced acids.

Wood-Carver, a shaper or ornamenter of wood; one who cuts figures and designs in wood.

Woodcut, an engraving on wood; an impression taken therefrom.

Wood-Cutter, one who fells timber; a person who saws or chops up wood.

Wood-Engraver, an artist who cuts pictures or drawings on blocks of boxwood, to take impressions from.

Wood-Engraving, the art of producing raised surfaces by excision on blocks of wood, from which impressions can be transferred to other surfaces, was undoubtedly known to the Egyptians; but they appeared to have used their wooden stamps solely for the purpose of stamping on clay or other ductile material; and the earliest application of *W.-E.* to the production of a book is supposed to have been in China, about the middle of the 10th century, and was probably first used for the production of playing-cards, the outlines of which were formed by impressions from woodcuts, and the coloring filled up by hand. The art made rapid progress; and the next great step was the production of books printed from wooden types, and illustrated with pictorial woodcuts. Towards the close of the 15th century, the art had attained an excellence which induced artists of celebrity and talent to select it as the means of conveying their designs to the world. From the end of the 16th century the art to a great extent declined; but towards the close of the 17th century, a certain Mr. Bewick devoted himself with enthusiasm to the art, and from that time it has continued to flourish.

Originally, various kinds of wood, such as plum-tree, beech, mahogany, and pear-tree, were employed for *W.-E.*, and are still frequently employed for coarse work; but there is no wood so suitable for this purpose as box, as it combines all the qualities necessary to admit of the most delicate execution. Upon a good piece of the small close-grained English box, the finest line can be preserved in unbroken smoothness. The tools of the wood-cutter consist exclusively of gravers, small gouges, and chisels. The block is placed on a small circular leathern cushion filled with sand, which affords not only a firm rest to the smooth wood, but permits it to be freely turned in all directions. The graver is held and used in a manner peculiar to this kind of engraving. The butt of the handle rests against the palm of the hand, three of the fingers closing round it, while the thumb is projected forward upon the block, serving at once as a rest for the blade and a check to regulate the force in cutting, the motion of the tool being regulated by the forefinger. When an engraved block is damaged, or a serious error made, the only remedy is to drill out the part to the depth of about half the thickness of the wood, and to insert a tight-fitting plug, tapered at the bottom to insure its being driven home. The top of the plug is made level with the surface of the block, and the part redrawn and engraved. The comparative merits of wood and steel engraving have sometimes been much discussed. The fact appears to be, that each is best

suited for the production of certain effects. There is a certain mellow richness of tone about a highly finished steel print which cannot be rivalled by an engraving on wood; and on the other hand, the latter is unrivalled for the production of broad, bold contrasts and sparkling, sketchy effects. The special advantage, however, which *W.-E.* possesses over all other forms of graphic art, is its applicability to the purposes of book-illustration in the form of *text-cuts*, that is, cuts inserted and printed in the pages of type.

Wooden-Shoe, a sabot; a shoe shaped out of wood.

WoodenWare, a general name for buckets, bowls, churns, and an infinite variety of wooden household articles.

Woodland, ground covered or interspersed with timber; forest-land.

Woodman, a timber-cutter; a lumberer.

Wood-Merchant, a dealer in timber; a vendor of firewood.

Wood-Pipe. See SMOKING-PIPE.

Woodroof, WOODRUFF, a wild plant, the *Asperula odorata*, found in woods in Europe. The herb while drying has the scent of new hay, approaching to bitter almonds or heliotrope. This pleasant scent has been used for flavoring wine, perfuming cloths, etc.

Wood-Sorrel, the *Oxalis acetosella*, a wild plant which is powerfully and most agreeably acid, making a refreshing and wholesome conserve with sugar.

Wood-Type, large letters for printing with, cut in wood, used for placards and job-work.

Woof [Fr. *trame;* Ger. *Schuss;* It. and Sp. *tramo*], the weft or cross texture of fabrics.

Wool [Fr. *laine;* Ger. *Wolle;* It. and Sp. *lana;* Port. *lâa*], the fleecy covering or *pile* of the sheep. (See SHEEP.) It has been customary to divide *W.* into three classes,—long, short, and coarse or carpet *W.*; and these again into subordinate classes, according to the fineness of the fibre.—*Short staple W.* is used in the cloth manufacture; and is, therefore, frequently called clothing *W.* To this class belong the Saxon and Silesian *W.* of Germany, a portion of the *W.* of Australia, of the Cape of Good Hope, Buenos Ayres, Russia, Canada, and the bulk of the *W.* produced in the U. States; all the above being of merino blood, immediate or remote. The qualities and values of these are about in the order in which they are inserted above, the Saxony *W.* being best adapted to the very finest qualities of broadcloths. Short *W.* may vary in length from 1 to 3 or 4 in.; if it be longer, it requires to be cut or broken to prepare it for the manufacture. The *felting* property of *W.* is known to every one. The process of hat-making, for example, depends entirely upon it. The *W.* of which hats are made is neither spun nor woven; but locks of it, being thoroughly intermixed and compressed in warm water, cohere and form a solid, tenacious substance. Cloth and woollen goods are made from *W.* possessing this property; the *W.* is carded, spun, woven, and then, being put in the fulling-mill, the process of felting takes place. The strokes of the mill make the fibres cohere; the piece subjected to the operation contracts in length and breadth, and its texture becomes more compact and uniform. This process is essential to the beauty and strength of woollen cloth. But the long *W.* of which stuffs and worsted are made is deprived of its felting properties. This is done by passing the *W.* through heated iron combs, which takes away the laminæ or feathery part of the *W.*, and approximates it to the nature of silk or cotton.—*Long staple W.* is also called combing *W.* and delaine *W.* To this class belong the long, lustrous down combing-*W.* of Leicester, Lincolnshire, and Cotswold; the soft combing-of *W.* Rambouillet of France; the soft long-staple *W.* of Australia; the Cheviot *W.* of Scotland; and the combing-*W.* of Canada, Ohio, Kentucky, Pennsylvania, New York, and Maine, and other parts of the U. States, all derived from the Leicester or other English blood. The French and Australian are most esteemed for female dress-goods, such as merinos, cashmeres, thibets, etc.; the Cheviot for the Scotch tweeds, and the English for worsted goods generally. The American wools of this class are of a medium quality. Long *W.* may vary in length from 3 to 8 in. The shorter combing-*W.* are principally used for hose, and are spun softer than the long combing wools; the former being made into what is called hard, and the latter into soft worsted yarn.—To the third class, the *coarse staple W.* which are adapted for carpets, belong the Donskoi and other coarse Russian *W.*, the native South American, Cordova, Valparaiso, native Smyrna, and other *W.*—The fineness of the hair or fibre can rarely be estimated, at least for any useful purpose, except by the wool sorter or dealer, accustomed by long habit to discern those minute differences that are quite inappreciable by common observers. In sorting *W.* there are frequently 8 or 10 different species in a single fleece; and if the best *W.* of one fleece be not equal to the finest sort, it is thrown to a 2d, 3d, or 4th, or to a still lower sort, of an equal degree of fineness with it. The best English short native fleeces, such as the fine Norfolk and Southdown, are generally divided by the wool-sorter into the following sorts, all varying in fineness from each other: viz. 1. Prime; 2. Choice; 3. Super; 4. Head; 5 Downrights; 6. Seconds; 7. Fine Abb; 8. Coarse Abb; 9. Livery; 10. Short, coarse, or breech wool. The relative value of each varies, according to the greater demand for coarse, fine, or middle cloths.

The softness of the fibre is a quality of great importance. It is not dependent on the fineness of the fibre; and consists of a peculiar feel, approaching to that of silk or down. The difference in the value of two pieces of cloth made of two kinds of *W.* equally fine, but one distinguished for its softness and the other for the opposite quality, is such, that, with the same process and expense of manufacture, the one will be worth from 20 to 25 per cent more than the other. Hard *W.* are all defective in their *felting* properties. In clothing *W.*, the color of the fleece should always approach as much as possible to the purest white; because such *W.* is not only necessary for cloths dressed white, but for all cloths that are to be dyed bright colors, for which a clear white ground is required to give a due degree of richness and lustre. Some of the English fine-woolled sheep, as the Norfolk and Southdown, have black or gray faces and legs. In all such sheep there is a tendency to grow gray *W.* on some part of the body, or to produce some gray fibres intermixed with the fleece, which renders the *W.* unfit for many kinds of white goods; for though the black hairs may be too few and minute to be detected by the *W.* sorter, yet when the cloth is stoved they become visible, forming reddish spots, by which its color is much injured. The Herefordshire sheep, which have white faces, are entirely free from this defect, and yield a fleece without any admixture of gray hairs. Whiteness of fleece is of less importance in the long combing than in clothing *W.*, provided it be free from gray hairs. Sometimes, however, the fleece has a dingy brown color, called a *winter stain*, which is a sure indication that the *W.* is not in a thoroughly sound state. Such fleeces are carefully thrown out by the *W.* sorter, being suitable only for goods that are to be dyed black. The fineness of heavy combing *W.* is not of so much consequence as its other qualities.

The following statement shows the quantities of *W.* produced, imported, exported. and retained for consumption in the U. States, from 1861 to 1879:—

Year.	Production.	Imports.	Total production and Imports.	Exports.			Retained for home consumption.
				Domestic.	Foreign.	Total.	
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
1861	75,000,000	....	....	847,301	....	....	....
1862	90,000,000	42,131,061	132,131,061	1,153,388	332,953	1,486,341	130,644,720
1863	106,000,000	73,931,944	179,931,944	.355,722	708,850	1,064,572	178,867,372
1864	123,000,000	90,464,002	213,464,002	155,482	223,475	378,957	213,085,045
1865	142,000,000	43,840,154	185,840,154	466,182	679,281	1,145,463	184,694,691
1866	155,000,000	76,532,274	231,532,274	973,075	851,645	1,824,720	229,707,554
1867	160,000,000	16,558,046	176,558,046	307,418	618,587	926,005	175 632,041
1868	168,000,000	24,124,803	192,124,803	558,435	2,801,852	3,360,287	188,764,516
1869	180,000,000	39,275,926	219,275,926	444,387	342,417	786,804	218,489,122
1870	162,000,000	49,230,199	211,230,199	152,892	1,710,053	1,862,945	209,367,254
1871	160,000,000	68,058,028	228,058,028	25,195	1,305,311	1,330,506	226,727,522
1872	150,000,000	122,256,499	272,256,499	140,515	2,266,393	2,406,908	269,849,591
1873	158,000,000	85,496,049	243,496,049	75,129	7,040,386	7,115,515	236,380,534
1874	170,000,000	42,939,541	212,939,541	319,600	6,816,157	7,135,757	205,803,784
1875	181,000,000	54,901,760	235,901,760	178,034	3,567,627	3,745,661	232,156,099
1876	192,000,000	44,642,836	236,642,836	104,768	1,518,426	1,623,194	235,019,642
1877	200,000,000	42,171,192	242,171,192	79,599	3,088,957	3,168,556	239,002,636
1878	207,000,000	48,449,079	255,449,079	347,854	5,952,221	6,300,075	249,149,004
1879	211,000,000	39,005,155	250,005,155	60,784	4,104,616	4,165,400	245,839,755

The countries from which the imports for the year 1879 were mostly received were: England, 16,742,071 lbs., valued at $2,136,819; Argentine Republic, 6,929,514 lbs., valued at $791,-883; Chili, 3,773,604 lbs., valued at $395,645; Canada, 2,510,-240 lbs., valued at $567,610; France, 2,500,694 lbs., valued at $286,612; Russia (Southern), 1,786,893 lbs., valued at $233,-177; and Uruguay, 1,113,231 lbs., valued at $108,673.

The value of *W.* imported into, and exported from the U. States from 1850 to 1879, was as follows: —

Year.	Imports.	Exports.		Excess of imports over exports.
		Domestic.	Foreign.	
	$	$	$	$
1850	1,690,380	22,778	....	1,667,602
1851	3,847,474	....	10,861	3,836,613
1852	1,931,516	14,308	54,980	1,862,228
1853	2,678,606	26,567	52,845	2,599,194
1854	2,834,226	33,895	41,668	2,758,663
1855	2,088,971	27,802	131,442	1,929,727
1856	1,678,248	27,455	18,757	1,632,036
1857	2,126,319	19,007	1,203	2,106,109
1858	4,022,635	211,861	824,898	2,985,876
1859	4,444,954	355,563	32,141	4,057,250
1860	4,843,385	389,512	39,266	4,414,607
1861	5,007,053	237,846	104,731	4,664,476
1862	6,524,612	296,225	79,202	6,149,185
1863	12,555,563	178,434	187,849	12,189,280
1864	15,977,406	66,358	134,634	15,776,414
1865	7,728,383	254,721	292,721	7,180,941
1866	10,589,029	264,398	155,180	10,169,451
1867	5,905,708	130,857	174,003	5,600,848
1868	3,793,365	191,119	446,572	3,155,674
1869	5,600,958	152,443	44,211	5,404,304
1870	6,743,350	54,928	212,121	6,476,301
1871	9,780,443	8,762	155,755	9,615,926
1872	26,214,195	36,434	355,993	25,821,768
1873	20,433,958	17,624	1,543,671	18,872,643
1874	8,250,306	72,169	1,393,496	6,784,641
1875	11,071,259	62,754	691,821	10.316,684
1876	8,247,617	13,845	318,478	7,915,294
1877	7,156,944	26,446	472,519	6,657,979
1878	8,363,015	93,358	941,041	7,328,616
1879	5,034,545	17,644	629,798	4,387,103

Manufacture of W. — The art of forming *W.* into cloth and stuffs was known, it is supposed, in all civilized countries, and in very remote ages, and probably of linen also. Woollen cloths were made an article of commerce in the time of Julius Cæsar, and are familiarly alluded to by him. They were made in England before A. D. 1200, and the manufacture became extensive in the reign of Edward III., 1331. "The policy of England toward the American colonies, so long as they remained subject to her control, was directly intended to discourage and repress manufactures of all kinds, those of woollen goods included. The actual result was that the domestic manufacture of coarser or 'home-made' cloths became very widely spread and considerable; and the importations of foreign cloths were proportionally small. A society organized within the present State of New York, in 1765, repudiated foreign cloths, and adopted various measures for increasing the home manufacture, even to rules requiring that the flesh of sheep and lambs should not be eaten, nor the animals slaughtered. The supply of wool appears to have been large, and it was mostly worked up and disposed of within the colonies. Many thousands of weavers and cloth workers are said to have come over about the year 1774. The report of Alexander Hamilton on manufactures, in 1791, speaks of a mill for cloths and cassimeres as in operation at Hartford, Conn., but conveys a doubt whether American wool was suitable for fine cloths. The census of 1810, without making it evident that there was within the State at the time a single woollen manufactory, gives for New York the number of looms (largely in private hands) as 33,068, with 413 carding machines, 427 fulling mills, and 26 cotton manufactories. The total value of woollen manufactures for the U. States in the same year was estimated at $25,608,788. From this time the domestic manufacture seems to have fallen off rapidly, and the succeeding census returns must be taken as indicating mainly the production of factories." — *The Am. Cyclopædia.* — The total value of woollen goods, which was only $4,413,068 in 1820, was returned by the last census at $195,908,-253, besides $21,761,578 for carpets. The principal centres of the woollen industry in the U. States are in New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, and Pennsylvania. Until 1840 a very great proportion of the cloths imported were of English make; since that time the superior dye and finish of French and German cloths have led to their importation to an extent relatively much greater than before. The value of imports of woollen goods (carpets excluded) into the U. States for the year 1879, was as follows: —

Cloths and Cassimeres	$6,255,195
Shawls	1,367,927
Blankets	1,675
Dress-goods	12,436,861
Hosiery, shirts, and drawers	393,825
Other manufactures not specified	3,511,112
	$23,966,595
Our exports for the same year were valued at	$338,615

Woollen Cloth Manufacture. The best woollen cloth is made wholly of new wool; the exceptions to this rule for inferior cloth, will be noticed presently. The processes are more numerous than in the cotton manuf., owing to the peculiarities connected with the *nap* of the cloth. — *Sorting.* Every bag or bale of wool, weighing from 1 to 1½ cwt. contains various qualities of fibre, which require to be separated for different kinds of cloth. A sorter, with the wool opened and spread out before him on a table, separates it into kinds. The names given to these kinds are curiously technical: *picklocks, prince, choice, super, head, downright, seconds, fine abb, coarse abb, livery, short coarse, breech,* etc. The sorter makes as many subdivisions as the kind of wool suggests. — *Scouring.* The sorted wool is scoured or washed in alkaline liquor, heated to a temperature of 120° F., to drive out as much of the grease and dirt as possible, after which it is washed in clean water. — *Dyeing.* If the cloth is to be dyed after weaving, it it called *piece dyed;* if before, *wool dyed.* The processes of the dye-house are such as are noticed under Dyeing. — *Devilling.* The *willy* or *devil* is a wooden cylinder studded with iron spikes, and enclosed in an outer case. The wool, fed into the machine along an endless web, is pulled asunder by the revolving spikes. This renders the fibres easy to work, and at the same time shakes out dust and dirt from between them. — *Picking.* The opened wool, spread out on a table, is examined by women who pick out and separate all slight impurities, which would otherwise deteriorate the cloth. In some factories a *burring machine* is used for this purpose, comprising a number of fluted rollers, iron beaters, and comb cylinders, which cleanse the fibres in various ways. — *Oiling.* The wool, by this time nearly free from impurities, is spread out in a thick layer on a stone floor, and sprinkled with Gallipoli, or some other oil; 1 lb. of oil to

about 6 lbs. of wool. It is passed a second time through the willy, to mix the oil with the fibres. — The *scribbling machine* converts the mass of oiled wool into a broad, thin, flat fleece, or lap, with the fibres opened and separated. It is used two or three times over, to effect this separation more completely. — The *carding engine*, like the scribbling machine, is similar to the machines used in the cotton manuf., seeing that its action depends chiefly on comb-teeth fixed to revolving cylinders. The engine, after combing the wool, brings it to the form of separate flat *slivers*, a few feet long, and then into round *rovings*, like short pieces of soft cord. — The *slubbing-billy* is a machine comprising a movable frame, spindles, rollers, and wheels, so adjusted that, when the rovings are placed upon a kind of endless apron, they are drawn into the machine, joined end to end, stretched, and slightly twisted. An improvement on the slubbing-billy is the *slubbing machine*. A more recent invention, called the *condenser*, combines the slubbing with the carding processes. — *Spinning*. Wool is more frequently spun by the *mule* process than the *throstle* process. These are described under SPINNING.—*Spooling*. Matters are by this time advancing towards the weaving of the wool into cloth. The yarns are wound upon bobbins, transformed into skeins by a kind of reel, and then *spooled*, or wound upon another set of bobbins, called *spools* (Fig. 497). — *Weaving*. After *sizing*, *beaming*, and one or two subsidiary processes, the yarns are *woven* into cloth. See WEAVING. In the technical language of the woollen mills, a *bier* is 40 warp threads; 5 biers make a *hundred;* in ordinary broadcloth of 1¾ yds. wide, there are 18 of these double hundreds, or 3,600 separate warp threads; finer cloths will go up to 6,000 threads or more. The processes of weaving are very much varied, according as the cloth is to be single, double, twilled, napped, ribbed, etc. — *Fulling; Teazling; Shearing*. Then comes the operation by which the cloth is thickened, narrowed and shortened, and the fibres matted or felted together; for which see FULLING. Next the remarkable mode of working up the surface into a pile or shag, which is called teasling, or teazling. And after that, the delicate operation of cutting the pile into a smooth nap, described under SHEARING. — *Finishing*. The cloth is now nearly finished, and only requires a few final processes. It is piled up into a heap, with smooth, metal plates between them; heavy pressure gives a smoothness and a glossiness, which are increased if the plates are first heated.

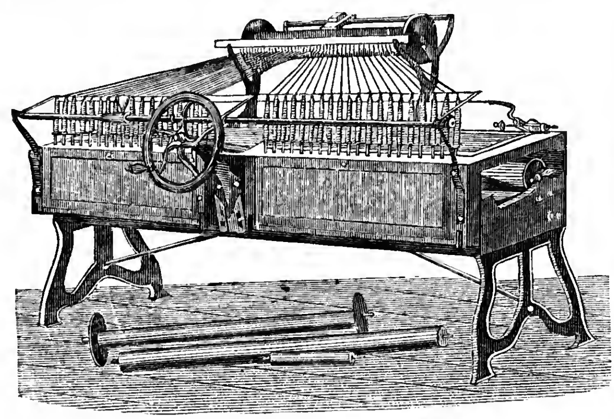

Fig. 497. — WOOL BOBBIN-WINDER.

This is aided by *boiling* or *steaming*, and by *brushing*, which remove certain defects produced by the pressing. Sometimes rolling is introduced, over cylinders which permit steam from within to act upon the cloth. — According to the last census, the particulars of the woollen goods industry in the U. States were as follows: —

Establishments, number	2,891
Steam engines, horse power	85,900
Water wheels, " "	59,332
Machines:	
Cards, sets	8,366
Daily capacity in carded wool, lbs	857,392
Broad looms, number	14,039
Narrow " "	20,144
Spindles "	1,845,496
Hands employed	80,053
Capital invested	$98,824,531
Wages paid during the year	$26,877,575

MATERIALS.

Cotton, lbs	17,571,929
Shoddy, "	19,372,062
Warp cotton, yds	1,312,560
Warp, lbs	140,733
Wool, domestic, lbs	154,767,095
" foreign, "	17,311,824
Yarn, cotton, "	3,263,949
" woollen, "	2,573,419
Chemicals and dye stuffs, value	$5,833,346
All other materials	$5,670,250
All materials	$96,432,601

PRODUCTS.

Blankets, pairs	2,000,439
" horse, number	58,552
Beavers, yds	261,208
Cloth, cassimeres, doeskins, yds	63,340,612
" felted, yds	1,941,865
Cloths, negro, "	1,932,382
Cottonade, yds	75,000
Coverlets, number	226,744
Flannels, yds	58,965,286
Frocking, "	75,000
Hosiery, dozens	21,460
Jeans, yds	24,489,985
Kerseys, yds	5,506,902
Linseys, "	14,130,274
Repellants,"	2,663,767
Carriage robes, number	22,500
Rolls, lbs	8,683,069
Satinets, yds	14,072,559
Shawls, number	2,312,761
Skirts, balmoral, yds	280,000
Tweeds and twills, etc., yds	2,853,458
Warp, lbs	122,000
Yarn, "	14,156,237
" hosiery, lbs	233,000
" shoddy, "	1,569,000
Miscellaneous articles, value	$3,251,368
All products	$155,405,358

Worsted Manufactures. As *long* wool possesses the felting or fulling property much less fully than *short*, the two kinds are adapted for different kinds of goods. *Stuffs* and *worsteds* are the generic names for the long-wool goods; but there are many other designations. The processes of manufacture are less numerous than for woollen cloth. — *Washing*. When the bags of long-wool are opened, the wool is *washed* in soap and water, to drive out as much of the grease and dirt as may be practicable. It is removed to a *drying-room*, where, spread over the floor, it is dried at a moderate heat. — *Plucking*. The dried wool is conveyed to a machine, where, instead of being torn asunder by spikes on a revolving cylinder, the locks or tufts are opened by the action of fluted rollers. — *Combing*. Long wool must be combed more thoroughly than short, as its excellence depends on other qualities than those of felting. In *hand combing* the workman employes two *combs* and a *post*. the comb consists of long steel spikes fixed into a back, which is held by a handle. One of the combs, heated over a peculiar kind of stove called a *comb-pot*, is fixed temporarily in the post with the spikes uppermost; and then the comber, taking a handful of wool, sprinkles the fibres with oil, and draws them repeatedly over and between the spikes, which comb them out. He places the comb and wool over the stove to renew the heat, and meanwhile operates in a similar way with the other comb; then the two combs, with their two charges of wool, are drawn over each other, the spikes of one uppermost and those of the other downwards, whereby the combing is carried still further. Another combing follows at a lower heat. The short fibres combed out by this process, called *noyls*, are reserved for spinning into inferior goods. In *machine combing*, as an improvement on a laborious and unhealthy employment, the wool is temporarily fixed to the surfaces of two cylinders studded with teeth; the cylinders revolve near each other, and the teeth on one comb comb the fibres attached to the other, the cylinders being heated to the proper temperature by steam power within. — *Breaking*. The wool, separated into slivers by combing, is laid upon a feeding-apron; as this apron travels forward, other slivers are laid on, so overlapping as to get entangled with the ends of those first applied; this is continued until many slivers become united into one continuous length, the *breaking frame* being so constructed as to facilitate this operation. — *Drawing*. The long slivers, received into cases, are transferred to the *drawing frame*, which acts very much in the same way as the breaking frame, uniting into greater lengths the pieces which have been in shorter lengths, but at the same time twisting them slightly, and winding them on bobbins. The speed with which the drawing frame works regulates the length and tensity to which the fine, soft cord is

brought. The roving, spinning, and weaving processes bear a good deal of resemblance to those described in connection with the cotton manuf. — much more so than with the woollen-cloth manuf. For goods in which old wool is mixed with new, see SHODDY. According to the last census, the particulars of the worsted goods manuf. were as follows: —

Establishments, number	102
Steam engines, horse power	8,382
Water wheels, " "	4,634
Machines:	
Braiders, number	7,334
Cards, sets	98
Domestic combing machines, number	95
Foreign combing machines, number	66
Knitting machines, number	176
Looms, number	6,128
Spindles, "	200,617
Hands employed	12,920
Capital	$10,085,778
Wages	$4,368,857
MATERIALS.	
Chemicals, etc	$1,259,016
Cotton, lbs	2,463,808
Shoddy, "	12,342
Domestic wool, lbs	13,317,319
Foreign " "	3,836,982
Cotton yarn, "	2,146,500
Woollen " "	46,240
Worsted " "	1,958,880
All materials, value	$14,308,198
PRODUCTS.	
Braids and lacings, lbs	2,324,330
Cloaking, yds	5,000
Delaines, "	40,804,385
Fancy goods, value	$1,974,957
Shawls, number	111,404
Shirts and drawers, dozens	4,080
Balmoral skirts, yds	433,288
Other skirting, "	51,851
Webbing and tape, yds	2,006,000
Worsted dress goods, yds	12,057,006
Woollen yarn, lbs	284,100
Worsted " "	4,047,750
Zephyr goods	3,900
All products, value	$22,090,331

Imp. duty: —

Wool on sheep-skins, washed or unwashed, same as other wool.

Class I. — Clothing wools, washed or unwashed, value 32 cts. or less per lb., 10 cts. per lb. and 11 per cent; value exceeding 32 cts. per lb., 12 cts. per lb. and 10 per cent.

Class II. — Combing wools, value 32 cts. or less per lb., 10 cts. per lb. and 11 per cent; value exceeding 32 cts. per lb., 12 cts. per lb. and 10 per cent.

Class III. — Carpet wools, value 12 cts. or less per lb., 3 cts. per lb.; value exceeding 12 cts. per lb., 6 cts. per lb.

" of Class I. washed, double duty.

" of all classes, scoured, treble duty.

Woollen rags, 12 cts. per lb.

Woollen and worsted yarns, not exceeding 40 cts. per lb., 20 cts. per lb. and 35 per cent; over 40 cts., not exceeding 60 cts. per lb., 30 cts. per lb. and 35 per cent; over 60 cts., not exceeding 80 cts. per lb., 40 cts. per lb. and 35 per cent; above 80 cts. per lb., 50 cts. per lb. and 35 per cent.

" balmorals, composed wholly or in part of wool, worsted, the hair of the alpaca goat or other like animals, value not over 40 cts. per lb., 20 cts. per lb. and 35 per cent; over 40 cts., not over 60 cts. per lb., 30 cts. per lb. and 35 per cent; over 60 cts., not over 80 cts. per lb., 40 cts. per lb. and 35 per cent; over 80 cts. per lb., 50 cts. per lb. and 35 per cent.

" balmoral skirts and skirting, and goods of similar description, or used for like purposes, composed wholly or in part of wool, the hair of the alpaca goat or other like animals, made up or manufactured, except knit goods, 50 cts. per lb. and 40 per cent.

" belts, endless, for paper or printing machines, 20 cts. per lb. and 35 per cent.

" beltings, bindings, braids, buttons, or barrel button, and buttons of other form for tassels or ornaments, cords, dress trimmings, fringes, galloons, gimps, head-nets, webbings, wrought by hand or braided by machinery, made of wool, worsted, or mohair, or of which wool or mohair is a component material, 50 cts. per lb. and 50 per cent.

" blanketing for printing-machines, 20 cts. per lb. and 35 per cent.

Woollen cloth, n. o. p. f., 50 cts. per lb. and 35 per cent.

" dress goods, women's and children's, and real or imitation Italian cloths, composed wholly or in part of wool, worsted, the hair of the alpaca goat, or other like animals, valued at not exceeding 20 cts. per square yard, 6 cts. per square yard and 35 per cent.

" dress goods, women's and children's, and real or imitation Italian cloths, composed wholly or in part of wool, worsted, the hair of the alpaca goat, or other like animals, valued at above 20 cts. per square yard, 8 cts. per square yard, and 40 per cent.

" " all weighing 4 ounces and over per square yard, 50 cts. per lb. and 35 per cent.

" manufactures of wool, or of which wool shall be the component material of chief value, n. o. p. f., 50 cts. per lb. and 35 per cent.

" " of every description, composed wholly or in part of worsted, except such as are composed in part of wool, n. o. p. f., value not over 40 cts., 20 cts. per lb. and 35 per cent.

" " from 40 to 60 cts., 30 cts. per lb. and 35 per cent.

" " from 60 to 80 cts., 40 cts. per lb. and 35 per cent.

" " above 80 cts., 50 cts. per lb. and 35 per cent.

" hats. See BALMORALS.

" hat bodies. See MANUFACTURES OF WOOL, n. o. p. f.

" hosiery (knit goods). See BALMORALS.

" listings, 50 cts. per lb. and 35 per cent.

" shawls, 50 cts. per lb. and 35 per cent.

Wool-Broker, a dealer in wool, on account of importers and merchants.

Wool-Clippings, PEDLAR'S WOOL, the least valuable portions of wool clipped from the fleece.

Wool-Dyed, yarn dyed after being scoured and before making up; not piece-dyed.

Woollen, made of wool.

Woollen-Cords, a manufacture of one part cotton and three parts wool.

Woollens. See WOOL.

Wool-Merchant, a wholesale dealer in wool; an importer of foreign wool.

Wool-Moater, in England, a boy employed in picking wool, and cleansing it from lumps of pitch and other impurities.

Wool-Sheet, a packing-wrapper for bales of wool.

Wool-Sorter, a man employed in sorting the wools of different lengths, qualities, and countries, into the kinds suited for special manufactures.

Wool-Stapler, a wool-sorter in the manufacturing districts; a wholesale dealer in wool.

Wool-Stocks, heavy wooden hammers for milling cloth, or driving the threads of the web together.

Wool Waste is dutiable as "woollen yarns" by decision of the Secretary of the Treasury, March, 1867. See YARN. The quotations of wool waste in the English wool markets are: white stockings, pulled; colored stockings, pulled; and moreens black, pulled.

Wool Weight. In the U. States and in England wool is packed in bales of variable weight and sold by the lb. The English, however, use also the following divisions in weighing wool: —

7	lbs. avoirdupois	1 clove.
2	cloves, or 14 lbs	1 stone.
2	stones, or 28 lbs	1 tod.
6½	tods, or 182 lbs	1 wey.
2	weys, or 364 lbs	1 sack.
12	sacks, or 4,368 lbs	1 last.
20	lbs	1 score.
12	scores	1 pack.

The weight of the bale or pack of wool from different countries varies. See BALE.

Woorari, WOURALI, a virulent poison made by the Indians of Guiana from several plants, of which the *Strychnos toxifera* appears to be the principal.

Wootz, a valuable kind of steel made in India from magnetic iron ore, and celebrated for the toughness and durability of the cutting edges made from it.

Work, labor or employment; occupation of any kind. — Embroidery, needlework, or sewing. — The resulting product of labor. — A book. — To ferment or froth.

Work-Box, a lady's table-companion, with instruments and materials for work.

Working-Classes, laborers and operatives; those engaged in manual labor.

Workman, a mechanic or operative; an assistant in any handicraft.

Workshop, a carpenter's shed; a tailor's working-room; any place where work is carried on.

Worm, a spiral metal pipe or screw; the tubular coil of a still, lodged in water, through which the spirit is run or condensed.

Worming, a seaman's term for filling up the interstices of a rope, so as to render it even for wrapping over, or serving, as it is termed, with yarn; removing the ligament under a dog's tongue.

Worm-Powder, a vermifuge, or medicine for expelling worms.

Worm-Seed, a commercial substance composed principally of the flower-buds of some doubtful species of *Artemisia*, largely used in medical practice in Germany. The American wormseed, or "Jerusalem oak," *Chenopodium ambrosioides*, is a very common weed; the herb and seeds contain a peculiar essential oil, of very strong vermifuge properties.

Wormwood, a common name for several species of *Artemisia*, bitter aromatic herbs cultivated for medicinal purposes. All parts of *A. absinthium* are intensely bitter, with a strong odor due to a greenish volatile oil, which is separated by distillation and kept in the shops as oil of wormwood. It has long been in use as a powerful aromatic tonic, and is sometimes given to destroy worms; infused in spirits, it is a popular form of bitters. The Germans use it in the place of hops, to prepare *Wermuth beer*, and the French to make a liquor called *absinthe*.

Worsted, a thread spun of wool that has been combed, and which, in the spinning, is twisted harder than ordinary. It is chiefly used for knitting or weaving into carpets, stockings, caps, gloves, etc. See Wool.

Wort, a sweet infusion of malt; new beer unfermented. See Beer.

Wourali Poison. See Woorari.

Woven Fabrics. See Weaving.

Wove-Papers, writing-papers with a uniform surface, and not ribbed like laid papers.

Wrack-Grass, the *Zostera marina*, an aquatic plant, collected for manure, for making kelp, and for stuffing upholstery.

Wrapper, a railroad rug; a neck shawl; a dressing-gown or loose garment.

Wrapping-Paper, coarse packing-paper of various kinds, colors, and qualities.

Wreath, a garland of artificial leaves and flowers, worn on the head by ladies.

Wreck, in navigation, is usually understood to mean any ship or goods driven ashore, or found floating at sea in a deserted or unmanageable condition. But in the legal sense of the word, *wreck* must have come to land; when at sea, it is distinguished by the barbarous appellations of *flotsam*, *jetsam*, and *lagan*. See Flotsam. Wrecks, by the common law, belong to the king or his grantee, but if claimed by the true owner within a year and a day, the goods, or their proceeds, must be restored to him. In this country, the several States bordering on the sea have enacted laws generally similar to the English law.

Wreckage, the ruins or remains of a ship or cargo that has been wrecked.

Wrecker, one who plunders the wrecks of ships, or collects goods cast on the shore from wrecks. — A vessel used to save life and property from a wrecked vessel.

Wrench, an instrument for screwing or unscrewing.

Wrest, a turning instrument, such as a wrench, tuning-key, etc.

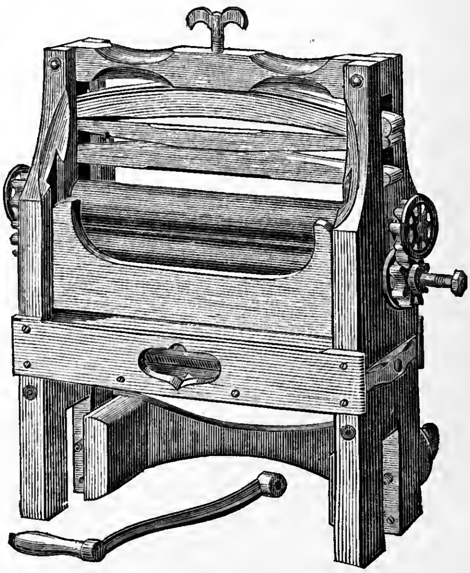

Fig. 498. — Bailey's Wringing Machine.

Wright, a maker, a workman; thus, there are cartwrights, ploughwrights, shipwrights, wheelwrights, etc.

Wringing-Machine, a machine (Fig. 498), for pressing or otherwise draining the water from cloth or clothes, by passing them between two rollers.

Writer, an author or clerk.

Writing, an inscription; a book; a deed or conveyance.

Writing-Book, a copy-book.

Writing-Case, a portable case holding writing materials.

Writing-Desk, a sloping school-desk. — A lock-up case with stationery, and the appliances for corresponding.

Writing-Ink. See Ink.

Writing-Paper, foolscap, post, and note paper, for writing on.

Wrought Iron, malleable iron; metal which has been beaten; not cast iron. See Iron.

W. S., abbreviation for "Writer to the Signet."

Würtemberg, a kingdom of the German empire, bounded on the W., S. W., and N. W. by the grand-duchy of Baden; E., S. E., and N. E. by Bavaria; and S. by the lake of Constance and Vorarlberg; lat. between 47° 35′ and 49° 35′ N., lon. between 8° 15′ and 10° 30′ E.; area, 7,532 sq. m. It is divided into the 4 circles of the Neckar, Black Forest, Jaxt, and Danube. Its capital is Stuttgart. Pop. 1,881,505.

The surface of *W.* is composed of hill and dale. In the Black Forest Circle the mountains attain the highest elevation, Baiersbronn being 3,781; Schwarzkopf, 3,584; Gaiskopf, 3,455; and Lemberg 3,313 ft. above the sea. Rich pastures, cultivated fields, orchards, gardens, hills covered with vines, and mountains with forests, give the most diversified scenery. The most important rivers are the Neckar, the Danube, and the Main. The prevailing rocks are granite, gneiss, limestone, and various sandstones. Tourmaline, cobalt, bismuth, silver, malachite, chalcedony, gypsum, copper, rock-crystal, and iron occur. The peat-lands are extensive, and yield annually 450,000 florins. There are many springs of mineral waters, those of Cannstatt and Stuttgart being much frequented. The climate is mild and healthy, but in the highlands the winters are long and cold. Wheat, oats, barley, rye, potatoes, beans, maize, turnips, mangold-wurzel, lucerne, etc., are the principal agricultural products. The manufactures are chiefly linen, woollen, cotton, and silk fabrics. Wool and cotton spinning, bleaching, dyeing, printing, iron-founding, making machinery, cutlery, gold and silver articles, glass, porcelain, earthenware, tile, cabinet-work, sawing wood, carriage-building, grinding corn, book-printing, and the cognate trades, are principal industries.

Wyoming, a territory of the American Union, situated between lon. 27° and 34° W., and between lat. 41° and 45° N. from Washington, with an average length of 355 m., and width 276 m. It has Dakota and Nebraska on the E., Colorado and Utah on the S., Montana on the N., and Utah and Idaho on the W., and embraces an area of 97,883 sq. m., or 62,645,120 acres. Pop. 30,000.

The S. E. part of *W.* is watered by the North Fork of the Platte and its affluents, among which are Laramie and Sweetwater Rivers, Lodge Pole, Rock, Poison Spring, Medicine Bow, Horse, and Rawhide Creeks. The N. E. section is drained by the North and South Forks of the Big Cheyenne River, flowing eastward and discharging its waters into the Missouri near Fort Sully, in Dakota. The streams draining the S. W. are Green River and its numerous affluents, whose waters ultimately find their way into the Pacific Ocean, through the Colorado of the W. and the Gulf of California. The N. W. is watered by the Big Horn and Yellowstone Rivers — affluents of the Missouri — flowing N. through S. E. Montana. All the small streams W. of the Wind River Mountains, in the N. W. part of the Territory, flow W., constituting part of the head-waters of Snake River, which flows W. through southern Idaho, and thence N., forming part of the W. boundary of the latter Territory, thence turning again to the W. into Washington Territory, where it unites with the Columbia in its W. course to the Pacific. The main range of the Rocky Mountains, which to the N. constitutes the E. boundary of the Territory of Idaho, enters *W.* at the N. W., extending in a S. E. direction through the Territory into Colorado. The Wind River Mountains constitute the culminating crests of the main range of the Rocky Mountains in the N. W. part of *W.*, like the Bitter Root Mountains between Idaho and Montana, and the Sierra Madre in Colorado, which constitute the main continental divides. The Snow Mountains lie E. of the Wind River range, being a prolongation S. from Montana. This range has the valley of the Yellowstone on the W., and that of the Big Horn on the E. The Big Horn Mountains lie still further E., also in the N. part of the Territory, between the valley of the Big Horn and Powder Rivers. The Rattlesnake Mountains are S. of the Big Horn Mountains, near the geographical centre of the Territory. The Black Hills, which constitute the E. foothills of the Rocky Mountains, occupy part of the E. section of the Territory, extending from Dakota in a S. W. direction. Medicine Bow Mountains are in the S. part of *W.*, between the Laramie River and the North Fork of the Platte. The Red Buttes are N. of Medicine Bow Mountains and the Laramie Plains. Independence Rock, near the E. terminus of the Granite Ridge, is situated between the Rattlesnake and Medicine Bow Mountains, at the confluence of the Sweetwater River with the North Fork of the Platte. The Sweetwater range lies W. of Independence Rock, on the S. side of Sweetwater River, Bishop and Quien Horned Mountains, E. of Green River, near the S. boundary of the Territory, being spurs of the Sierra Escalante, in Colorado. The greatest altitude of the Wind River range is Fremont's Peak, near lon. 110° W. from Greenwich, and lat. 43° 30′ N. It rises 13,750 ft. above sea, and is one of the highest culminating crests of the great Rocky Mountains system. It is the initial point of three watersheds, — the Columbia, flowing into the Pacific; the Colorado of the W., discharging its waters into the Gulf of California; and the Missouri, whose waters find their way ultimately into the Gulf of Mexico. The Laramie Plains are an extensive high plateau, or table-land in the S. part of the Territory, W. of the Black Hills, extending W. to the Wahsatch Mountains. These vast plains embrace an area of 30,000 sq. m., underlaid with lignite or brown coal of the tertiary age. These vast deposits average from a few inches to 15 ft. in thickness. The most E. limit of this coal basin W. of the Laramie range is 10 m. W. of Rock Creek, a branch of Medicine Bow River; and outcroppings occur as far W. as Salt Lake, showing a connected series of deposits to cover the whole area. This coal, taken from outcroppings, is found to burn with a bright-red flame, emitting a good degree of heat, leaving scarcely any ash, and is quite as desirable for all domestic purposes as most of the bituminous coals of the E. States. This coal is non-bituminous. It exhibits a slight trace of sulphuret of iron, which by decomposition gives a *rusty-red* appearance to outcrops. Seams of jet from an inch to one foot in thickness occur occasionally in these coal-beds, which have the appearance of cannel coal. It is claimed that it makes 10,000 ft. of gas to the ton, Pittsburg coal making but 8,500. This coal is in use by the passenger engines of the Central Pacific R. R. for 500 m. W. of Ogden, and a ton of 2,000 lbs. runs an engine 75 m. The value of such large deposits of fuel here can hardly be over-estimated, when it is considered that the greater part of the adjacent States and Territories is remarkably deficient in fuel, either above or beneath the surface. In juxtaposition with these vast coal-beds are extensive deposits of nodular iron ore, while in the mountains surrounding the Laramie Plains deposits of iron ore of great thickness occur. The Union Pacific Railroad passes directly through these vast coal-fields, and will afford a ready means of transportation for the products of these mines either E. or W. The existence of these large deposits of mineral fuel, in connection with vast quantities of iron ore, all in accessible proximity to this great national thoroughfare, are circumstances calculated to exert a most powerful influence in the development of the resources of this region and the great West. These vast coal-fields and deposits of iron ore will prove of inestimable value, and exercise the same influence upon its development that the great coal-fields and iron mines of Pennsylvania have exercised in the East. Valuable mines of copper, lead, and gypsum are known to exist in the Territory. The mountainous portions of *W.* have been but imperfectly examined as yet. There is little question but that many sections will prove to yield rich deposits of gold and silver. Gulch mining is carried on in a great many places with gratifying results, but gulch diggings are soon exhausted, and for more lasting results attention must be directed to quartz mining. These deposits are by far the most numerous and valuable. We have no reliable data as to the exact extent and value of the mines in *W.* Building material of an excellent quality exists in abundance in almost every part of the Territory. Everywhere throughout the mountain regions superior marbles, granites, limestones, and syenites exist in immense quantities. Timber, consisting chiefly of pine, spruce, and hemlock, exists in abundance in almost every section of *W.* The immense forests on the Black Hills in the E., on the Medicine Bow, Elk, and other mountains E. of the main divide, as well as those W., on the head-waters of Green River, are hundreds of square miles in extent, and afford some of the finest timber in the country. These regions are watered by the great streams, — the Laramies, Medicine Bow, North Platte, Sweetwater, and Green River, — and during the high stages of water, lumber may be rafted down to the Union Pacific Railroad, and placed within the reach of ready markets, thus proving a source of immense revenue, and of the highest possible advantage to that portion of the Great West deficient in building-material. *W.* is strictly a mountainous region, its general surface being several thousand feet above the level of the sea. The exploration of the country has demonstrated that, with the aid of irrigation, there is a very considerable area which may be made available for the production of cereals and vegetables. The lands in the valleys and along the bases of the mountains, in many places, are very productive, and by irrigation are susceptible of high cultivation. The region of the Laramie Plains is high, but mostly well watered, and capable of raising vegetables and small grains in abundance. A large portion of *W.* produces a luxuriant growth of short, nutritious grass, upon which cattle will feed and fatten during the summer and winter without other provender. These lands, even in their present condition, are superior for grazing. The climate is mild and healthy, the air and water pure, and springs abundant. The temperature generally, for the greater portion of the year, is mild, yet subject to extreme cold in midwinter. The whole Territory abounds in mineral springs, — saline, chalybeate, sulphurous, and alkaline being the most common. Many of these springs are highly charged with medicinal properties, and some are already noted for their curative qualities. — The most important towns are Cheyenne, the political capital of the Territory, Laramie, Wyoming, Benton, Rawling Springs, Green River City, Bryan, Granger, and Piedmont on the Union Pacific Railroad. Settlements are being rapidly established in the vicinity of the Union Pacific Railroad, which passes through the S. portion of the Territory from E. to W. Valuable and permanent improvements are being made, while the mines of coal, gold, silver, and iron are in process of development. *W.* has two national banks, with a joint capital of $125,000.

Wyth, a name for the white hoop, or basket wyth of Jamaica, *Tournefortia bicolor.*

X

X, the Roman numeral for 10. It is also used in London and other places as a mark denoting a certain grade on malt-liquor casks, on flour barrels, etc., XX meaning a higher grade, XXX a still higher grade, etc.

Xanthic-Acid, a yellow acid obtained in combination with potassa, by agitating sulphuret of carbon, mixed with solution of pure potassa, in strong alcohol.

Xebec, a small lateen-rigged three-masted vessel in the Mediterranean.

Xeres. See SPAIN (WINES OF).

Xilography, the art of cutting designs on wood, in such a manner as to leave the lines in *relief*, those parts which appear white in the impression from the block being cut away; it is the reverse of the method adopted in copper or steel-plate engraving, in which the *incised* lines yield the impression. The history of this art is intimately connected with printing; indeed, they may be considered as inseparable, inasmuch as the earliest type letters were cut in wood, and the earliest books were those known among bibliographers as "block-books," or books every page of which was cut, both letters and pictures, in a solid block of wood.

Xylotile, PARKESINE, the commercial name of a compound patented in England as a substitute for ivory. It has been for a time largely imported for the purpose of being used for knife-handles in place of ivory, in the manufacture of table cutlery. Its composition is substantially as follows: Gun-cotton, which is ordinary cotton converted by treatment with nitric acid into an explosive substance, is dissolved in naphtha, and converted into a clear but very adhesive liquid, termed collodion. The collodion thus formed is mixed with zinc-white, ivory-dust, and various coloring materials, and through kneading, baking, and pressure there results a hard, lustrous substance, resembling marble or bone, and capable of being sawed or worked as readily as either of the above-mentioned substances. *Imp.* free.

Xyster, a surgeon's bone-scraping instrument.

Y

Yacca-Wood, the ornamental wood of *Podocarpus coriacea*, a tree of the order *Taxaceæ*, used in the West Indies for cabinet-work.

Yacht, a light, decked, and elegantly fitted-up vessel for excursions of pleasure. *Yacht clubs* are associations formed with a view to improvement in yacht building for private owners and yacht sailing. When got up on a large scale, they are recognized and fostered by the governments under which they respectively exist, which furthermore extend to regularly established foreign clubs the privileges they accord to their own. The U. States, Great Britain, France, Holland, Belgium, and Russia, have their national, royal, or imperial clubs, but it is in the U. States and in Great Britain that these institutions have taken the firmest hold. The New York Yacht Club, established in 1844, numbering about 60 yachts and 500 members, has a commodious club-house on the banks of the Hudson, at Hoboken. In Great Britain, yacht clubs are very numerous, the oldest being the Royal Cork Yacht Club, originally called the Cork Harbor Water Club, established before 1720.

By acts of Congress, the Secretary of the Treasury is authorized to cause yachts, used and employed exclusively as pleasure vessels, and designed as models of naval architecture, and entitled to be enrolled as American vessels, to be licensed on terms which will authorize them to proceed from port to port of the U. States without entering or clearing at the custom-house. Such license shall be in such form as the Secretary of the Treasury may prescribe; provided, such vessels so enrolled and licensed shall not be allowed to transport merchandise or carry passengers for pay; and provided, further, that the owner of any such vessel, before taking out such license, shall give a bond, in such form and for such amount as the Secretary of the Treasury shall prescribe, conditional that the said vessel shall not engage in any unlawful trade, nor in any way violate the revenue laws of the U. States, and shall comply with the laws in all other respects. All such vessels shall, in all respects except as above, be subject to the laws of the U. States, and shall be liable to seizure and forfeiture for any violation of the provisions of this act. All such licensed yachts shall use a signal, of the form, size, and colors prescribed by the Secretary of the Navy; and the owners thereof shall at all times permit the naval architects in the employ of the U. States to examine and copy the models of said yachts.

Yak, a species of wild ox, the *Pœphagus grunniens* (Fig. 499), found in Thibet. The flesh serves for food. The hair is made into tents and ropes, and jackets and caps are formed of the skin. Its bushy white tail is much esteemed in the East, where it is borne as an emblem of authority, and used as a fly-flapper.

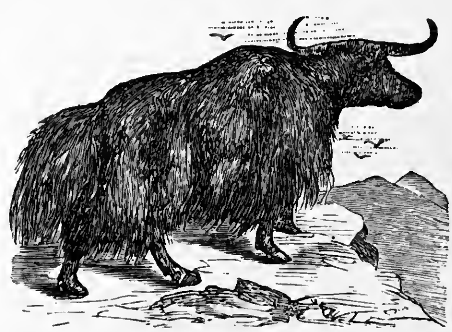

Fig. 499. — YAK.

Yam, a climbing plant, with large tuberous roots, forming one of the breadstuffs of the W. Indies, and other tropical regions, of which there are several species. The roots are very rich in nutritive fecula; hence they are much used as articles of diet. The common yam is the *Dioscorea sativa;* the winged, stalked or red yam (*D. alata*), the prickly yam (*D. aculeata*), and the bulb-bearing or Grenada yam (*D. bulbifera*). There are also other varieties, known under the names of Creole, Portu-

guese, Barbados, and Guinea yam. If sun-dried and packed in ashes, yam-roots will keep for about a month or six weeks. They contain a large amount of starch, but they are rather coarse, and are not generally esteemed by Europeans. In the S. States, the name is generally applied to light-colored varieties of the sweet-potato.

Yan, a Chinese measure of length, equal to 36.45833 yards.

Yaourt, a fermented liquor or milk-beer, similar to koumis, made by the Turks.

Yard, an enclosure with walls at the back or around a house, etc., as a court-yard or prison-yard. — The British and American standard measure of length and surface. See WEIGHTS AND MEASURES. — One of the long spars of timber, tapering slightly at the end, suspended upon the masts of vessels for extending the sails, and which are specially named according to their position and the mast on which they are hung. In a large ship there will be about 20 yards, some of very formidable dimensions. The main-yard of a liner or first-rate will be about 100 ft. in length and 2 ft. in diameter.

Yard-Arm, the end or point of a ship's yard, the portion projecting on each side of the mast.

Yard-Measure, a measuring wand, tape, or metallic ribbon of 36 inches.

Yarn [Fr. *fil;* Ger. *Garn, Zwirn;* It. *filo;* Sp. *hilo*], the name applied to the thread spun for the purpose of weaving cloths of various kinds. It varies not only in the materials of which it is made, but also in the fineness to which it is spun. This latter quality is of great importance, as upon it depends entirely the evenness and quality of the manuf. In order that uniformity may be insured, a pound of the material is taken as the standard, and this is divided into *hanks* or *cuts*. Thus, with linen yarn, a hank or cut consists of 300 yds.; and if it takes 25 of these hanks to make 1 lb. the *Y.* is called 25s; and if 40, 40s; and so on. A hank of wool or cotton consists of 840 yds. No material admits of such fine spinning as cotton. — *Grège Y.* is spun of wool and silk, and combines the greatest strength with the utmost fineness, and cannot be replaced by either wool or silk alone in the manuf. of long shawls, where it serves as warp. This was first, and for many years, exclusively made in France, so that in its manuf. the French were enabled to monopolize the markets of the world. The Germans, in beginning the cultivation of this branch of industry, were obliged to import the Grège *Y.* but it is said that in the way of spinning this *Y.*, they have overcome all the difficulties, which are great, as no silk must appear in the fabric, only just enough of it being added to the wool to insure the combination of the greatest strength and greatest fineness.

The quality of *Y.* is expressed in England by counts or *numbers*, denoting the number of hanks in a lb., signifying coarseness or fineness; reckoning the length of the hank of cotton *Y.* at 840 yds., or 7 leas or lays, of 120 yds. each. These "counts" range technically from 2 to 400 hanks in a lb. The hank of worsted *Y.* is sometimes counted in the same way, but more generally at 560 yds. or 7 leas of 80 yds. each. Linen *Y.* is estimated in England by the number of leas or cuts, each of 3 yds., contained in a lb. weight; but in Scotland, by the number of lbs. in a spindle, or 48 leas; thus, No. 48 in England, is called 1 lb. *Y.* in Scotland. The following are the principal subdivisions of each manuf.: —

COTTON-YARN MEASURE.

Inches,
54 = 1 thread.
4,320 = 80 " = 1 lea, or rap.
30,240 = 560 " = 7 " = 1 hank, or 840 yds.
A spindle of 18 hanks is 15,120 yds.

LINEN-YARN MEASURE.

Inches,
90 = 1 thread.
10,800 = 120 " = 1 lea, or rap.
108,000 = 1,200 " = 10 " = 1 slip.
2,160,000 = 24,000 " = 200 " = 20 " = 1 bundle.
A heer of 2 cuts, or 240 threads....... 600 yds.
A spindle of 24 heer................. 14,400 yds.
A bundle of $4\frac{1}{6}$ spindles .... 60,000 yds.

WORSTED-YARN MEASURE.

Inches,
35 = 1 thread.
2,830 = 80 " = 1 lea, or rap.
20,160 = 560 " = 7 " = 1 hank, or 560 yds.

Reels. — A cotton or linen reel is 54 in. in circuit. A worsted reel 30 in. in circuit. A hank of worsted *Y.* is 30 threads.

In the foreign linen-yarn measure
$85\frac{1}{2}$ Ermland inches = 1 thread.
3,420 " " = 40 " = 1 lea.
80 Hamburg " = 1 "
7,200 " " = 90 " = 1 lea.

Imp. duty: — *Y.* (carpet), consisting of wool waste, cow-hair, etc., as woollen *Y.* (see WOOL), coir, free; cotton, 35 per cent; cow and calf-hair, 20 per cent; flax and jute (flax chief value), 40 per cent; flax or linen (for carpets, but not over No. 8 lea), value not over 24 cents per lb., 30 per cent; the same value, over 24 cents per lb., 35 per cent; jute, 25 per cent; woollen and worsted (see WOOL); others, n. o. p. f., 20 per cent.

Yasmas, a dyed and printed Swiss fabric.

Yataghan, a sort of curved knife; a Turkish dagger or scimitar.

Yaupon, the *ilex cassine*, a N. American shrub of the holly family, found from Virginia to Florida, in light sandy soil, near the sea. The Indians held it in great estimation. An infusion of the slightly roasted leaves produces effects similar to those of Paraguay tea (see MATÉ), being at first exhilarating, if taken in moderate quantities, but in excess acting powerfully as an emetic and purgative. In districts where the plant grows naturally the leaves are sometimes used in moderate quantities as a substitute for Chinese tea.

Yaw, a sea term for a temporary deviation from the straight line or course of a boat or ship.

Yawl, a ship of war's boat, smaller than the pinnace, but nearly of the same form, and used for the same purposes; it is generally rowed with six oars.

Yearling, a young beast one year old, or in the second year of its age.

Yeast, the peculiar substance produced during the vinous fermentation of vegetable juices and decoctions, rising partly to the surface in the form of a frothy, flocculent, and somewhat viscid matter, insoluble in water and alcohol, and gradually putrefying in a warm atmosphere. It excites fermentation, and accelerates the process when added to saccharine and mucilaginous liquors. For the nature of *Y.* and the part which it plays in the process of vinous fermentation, see COMPRESSED YEAST. *Imp.* duty: yeast-cakes, free.

Yeast Powders, carefully prepared preparations of soda and phosphates, etc., in the form of powders, used as a substitute for yeast in leavening bread.

Yellow, a color of golden hue, of which there are many varieties.

Yellow-Berries, PERSIAN BERRIES, AVIGNON BERRIES, the dried, unripe berries of the *Rhamnus infectorius*, imported from the S. of Europe and the Levant, for the use of dyers.

Yellow-Flag, a flag hoisted at the masthead of a ship, denoting sickness, or that she is under quarantine regulations.

Yellow Metal, a composition metal of two thirds copper and one third zinc, for sheathing the bottoms of vessels with.

Yellow-Ochre, an argillaceous earth, colored by

an admixture of iron, which, when finely ground, is used as a pigment. It may be rendered red or reddish-brown by calcination in a reverbatory oven, which peroxidizes the iron.

Yellow-Wood, Trickle-Yellow, are names for the *Xanthoxylum clara Herculis*, a West Indian tree, having pungent and aromatic properties.

Yergas, a kind of coarse, woollen wrapper, made for horse-cloths.

Yew, a European tree of the pine family. Its timber is very heavy, fine-grained, elastic, and durable; the heart wood is of a fine orange-red or a deep-brown, and the sap wood, which is very hard, is pure white, with different shades where the two join, and both are susceptible of a fine polish.

Yezo. See Japan.

Yin, a Chinese weight of 2.666 lbs., also an itinerary measure of $40\frac{5}{8}$ yds.

Y'lang-Y'lang, a favorite and high-priced essence for the toilet, expressed from the leaves and flowers of a species of *Spirea*.

Y-Level, an instrument for measuring distance and altitude.

Yoke, a bow or curved wooden collar for draught-oxen; a piece of timber with straps and hooks, carried on the shoulders to suspend water-buckets or milk-pails. — A cross-piece fixed at the top of a boat's rudder, with lines to steer by.

Yokohama. See Japan.

Yolk, Yelk, a natural oily secretion, or greasy substance in wool, intended to nourish the growth and give pliability to the fibre. — The yellow part of an egg.

Youfts, Russia leather; another name for juffs.

Ypres Lace, a name for the finest kind of the Valenciennes lace.

Yu, a Chinese dry measure of very nearly $3\frac{1}{2}$ bushels.

Yucatan. See Mexico.

Yucca Fibre, the leaves of some species of yucca, treated like hemp or flax, afford a fibre which is used in the manuf. of cloth or cordage.

Yucca Starch, the glue or starch made at Carthagena from the stems of *Yucca gloriosa*.

Yusera, the horizontal stone in an oil mill.

Z

Zaffre, Zaffer. After the sulphur, arsenic, and other volatile parts of cobalt have been expelled by calcination, the residuum is sold, mixed or unmixed with fine sand, under the above name. When the residuum is melted with silicious earth and potash, it forms a kind of blue glass known by the name of smalt, of great importance in the arts. *Z.*, like smalt, is employed in the manuf. of earthenware and china, for painting the surface of the pieces a blue color. It suffers no change from the most violent fire. It is also employed to tinge the crystal glasses, made in imitation of opaque and transparent precious stones, of a blue color. It is almost wholly brought from Germany. *Imp.* free.

Zamitite, a hydrous carbonate of nickel from Spain, of a dull, emerald-green color.

Zante. See Greece.

Zante-Wood, a name for the Rhus, a species of sumach.

Zanzibar, a country on the E. coast of Africa, comprising the islands of Zanzibar, Pemba, and Mafia, and the coast opposite to them, from the island of Warsheikh, between lat. 2° 30′ N. and 10° 45′ S.

The islands of Zanzibar and Pemba are by far the richest and most important of the Seyid's or Sultan's dominions, distant from the coast about 25 m Z. is 55 m. in length, 25 in greatest breadth, comprising an area of 400,000 acres, with a soil of more than ordinary fertility, covered with woods and plantations of perpetual verdure. The principal products are cloves, rice, sugar-cane, manioc, millet, cocoanuts, and fruits, especially oranges, of the finest quality. The population of the island is estimated at 150,000. The chief people are Arab landed proprietors, possessing large plantations and numerous slaves; besides these are the free blacks and slaves, and about 6,000 natives of India, who are all engaged in commerce, and through whose hands nearly all the foreign trade passes. Zanzibar, or Beled-Zanzibar, the chief town, is located in lat. 6° 10′ S., lon. 39° 14′ E., has about 80,000 inhabitants. Its harbor is good, and generally safe at all seasons. The port is now the chief market for the ivory, gum-copal, and clove trade. There are also several important towns on the coast where native merchants reside, and whence caravans are sent into the interior to collect ivory and other products. In 1876 the imports, consisting of cotton goods, beads, arms, brass wire, etc., amounted to \$2,611,462; and the exports, consisting of gum-copal, cloves, ivory, cocoanut oil, seeds, etc., amounted to \$3,083,614.

Zapato [Sp.], a shoe; a kind of colored half-boots worn in Spain.

Zax, a slater's hatchet with a sharp point on the pole, for perforating the slate to receive the pin.

Zebra, the *Equus zebra*, a S. African animal, nearly allied to the ass. Its hide, marked with black and white transverse stripes, is sometimes used for hearth-rugs. This animal, the wild horse of Cape Colony, has been occasionally tamed, but is little used.

Zebra-Wood, a beautiful furniture-wood obtained in Demerara and Brazil, from a large tree, the *Omphalabium Lamberti*. The color is orange-brown, variously mixed.

Zedoari, a general name for the roots of several species of *Zingiber* and *Curcuma*. The long *Z.* of pharmacy is the palmate and tuberous roots of *Curcuma zerumbet*, and the round *Z.*, *C. zedoaria*, a native of Bengal and China, resembling ginger in its qualities.

Zeine, a soft, malleable substance found in maize, elastic like gluten.

Zeitung, Zeitungs Blatt [Ger.], a newspaper.

Zenith-Sector, an astronomical instrument for ascertaining the zenith distances of the stars.

Zephir-Cloth, a kind of kerseymere made in Belgium; a waterproof fabric.

Zephir-Shawl, a kind of thin, light worsted and cotton embroidered shawl.

Zephir-Yarn, a name for very soft, loosely twisted, dyed yarn or worsted, more usually called Berlin wool.

Zero, the freezing point of water on the Centigrade and Reaumur scales, and 32 degrees below the freezing point on Fahrenheit's scale. See Thermometer.

Zettel [Ger.], a billet or note; scrip.

Zeug [Ger.], cloth; ordnance.

Zeuxite. See Tourmaline.

Zibeline [Fr.], sable.

Zibibi [It.], sun-dried raisins; damask-grapes.

Zimmer [Ger.], a room or apartment; timber for building; a term for forty skins.

Zinc, Spelter [Fr., *zinc;* Ger., *zink;* It., *zinco;* Sp., *zinco, cinck*], a bluish white lustrous metal, having a crystalline, lamellar structure, moderate hardness, a somewhat low melting-point. To obtain it pure, commercial zinc, or spelter, as it is termed, is dissolved in pure dilute sulphuric acid; a cement of sulphuretted hydrogen is then passed through it, and it is filtered from any precipitate formed. The solution is then boiled to expel any sulphuretted hydrogen that may remain in it, and the zinc is precipitated in the form of carbonate by pure carbonate of soda. The carbonate is then ignited to transform it into oxide of zinc, which is distilled in a porcelain retort with charcoal prepared from loaf-sugar. Zinc is brittle at ordinary temperatures, but is possessed of considerable malleability and ductility at a temperature of between 200° and 300°, and may be wrought and rolled with ease. A little above this it becomes brittle again, and may be pulverized in a mortar. It fuses at 773°, and at a bright red heat it may be volatilized. If its vapor is exposed to the air, it burns with great splendor, becoming converted into oxide, which is deposited in loose flocculi. At the ordinary temperature it is not acted on by the air, but when exposed to moist air or oxygen, it becomes covered with a tenacious gray coating of hydrated oxide, which impedes the further oxidation of the metal beneath. In this respect zinc rust differs from iron rust, which seems to accelerate the oxidation of the adjacent metal. By the conjoint action of oxygen and carbonic acid, zinc roofing becomes converted into a mixed oxide and carbonate. When melted in the air, the oxide is formed much more rapidly. The metal is readily dissolved by the mineral and vegetable acids. The difficultly oxidizable nature of zinc, its cheapness, the ease with which it is extracted from its ores, and the ready way in which it may be worked, are bringing it daily more and more into use. Neither the vapor nor its oxide is poisonous. It is of the greatest use in the laboratory, for the precipitation of certain metals, and for the formation of hydrogen. For voltaic purposes it is indispensable, and its principal alloy, brass; is too well known to need description. It forms alloys with iron and several other metals. It also enters into the composition of German silver. Its sp. gr. varies, according to the closeness of texture of the sample, from 7.03 to 7.2.

Ores. Zinc is abundantly distributed in the form of various ores throughout the whole known world. Its principal ores are: *Red zinc ore*, which is found and worked in New Jersey. It consists of oxide of zinc, colored with binoxide of manganese. *Carbonate of zinc*, or *Calamine*, found extensively in the Devonian and carboniferous formations of most countries,

especially near Lancaster, Columbia Co., Pennsylvania, where the mines opened in 1853 are worked by the Lehigh Zinc Company. *Hydrated silicate of zinc*, which is worked extensively in the U. States. *Sulphide of zinc, blende*, or *black jack*, which is met with in large quantities in various parts of England and Europe. In the extraction of zinc from its ores, the blende or calamine is first crushed between rollers and roasted. In the case of the blende this is a tedious process, and requires great care. The result in either case is oxide of zinc, which is mixed with half its weight of powdered coke or anthracite, and introduced into crucibles of peculiar construction. A circular furnace is employed, within which the crucibles are ranged. In the bottom of each crucible is an opening, to which a short iron pipe is attached, passing through the bottom of the furnace. To the end of this is affixed a removable tube communicating with a sheet-iron vessel. The hole in the bottom of the crucible having been partially plugged with coke, a charge of ore and coal is introduced, and the top of the crucible luted down. The tube connected with the iron vessel is lowered so as to leave the crucible tube open, and the heat is raised. So soon as the flame at the mouth of the short iron tube begins to turn from white to blue, connection is made with the tube leading to the iron pan, and the zinc gradually distils downwards, partly in powder and partly stalactitic masses. The crude metal is re-melted, skimmed, and cast into ingots. In Silesia and Belgium retorts are used instead of crucibles, or *per ascensum* instead of *per descensum*. The following table, compiled by Messrs. Behr and Steine of New York, from the returns of the various works for the year 1875, exhibits the condition of the manufacture of metallic zinc in the U. States.

Works.	Locality.	Product. Tons of 2,240 lbs
New Jersey Zinc Co.	Newark, N. J.	625
Passaic Zinc Co.	Communipaw, N. J.	700
Bergen Port Zinc Co.	Bergen Port, N. J.	312
Lehigh Zinc Co.	Bethlehem, Pa.	1,505
Bamford Brothers	Near Lancaster, Pa.	54
Matthiessen and Hegeler Zinc Co.	La Salle, Ill.	3,500
La Salle Zinc Co.	La Salle, Ill.	1,329
Robert Lanyon & Co.	La Salle, Ill.	331
Illinois Zinc Co.	Peru, Ill	1,350
Martindale Zinc Co.	St. Louis, Mo	1,820
Missouri Zinc Co.	St. Louis, Mo.	1,285
Carondelet Zinc Co.	St. Louis, Mo	950
Chicago Zinc and Mining Co.	Cherokee, Kansas.	1,056
Total		14,817

For the year 1879, the imports of zinc in blocks, pigs, and sheets, into the U. States amounted to 2,567,717 lbs., valued at $108,494; while the exports of the same were 2,132,949 lbs., valued at $170,654.

Oxide. Zinc only forms one oxide, which occurs in nature as *red zinc ore*. The anhydrous oxide is formed when zinc is burnt in air, and has been occasionally found in four and six-sided prisms in the flues of zinc-furnaces. It is best prepared in the laboratory by calcining the precipitate produced by mixing solutions of sesquicarbonate of ammonia and sulphate of zinc. On the large scale, when it is required as a pigment, it is made by distilling zinc in clay retorts, passing into chambers through which a current of air is maintained. The volatilized metal burns at the high temperature to which it is exposed, and the oxide is deposited in the condensing chambers. Oxide of zinc forms a light white powder, which becomes yellow when heated, regaining its whiteness when it cools. It is a permanent oxide, even at the greatest heat. When exposed to the air, it becomes converted into a carbonate. It dissolves readily in acids. The hydrated oxide is formed by adding a solution of potash to the sulphate of zinc. It is readily soluble in excess of alkaline solutions. In medicine, oxide of zinc is used in ointments as an astringent and desiccant, and by itself as a tonic, especially in cases of nervous debility brought on by drinking.

Zinc White is the oxide above noticed, prepared for use as a pigment, or a substitute for white-lead. It is a white, tasteless powder, which is mixed with oil to make paint. Medical men strongly advocate the substitution of the harmless zinc white for the poisonous white-lead; but painters say that it has a tendency to crumble and peel off, as it does not combine intimately with the oil.

Uses of zinc. The pigs of zinc, as prepared in the smelting furnace, are ready for conversion into a large number of useful forms. The ingots or blocks are melted in a reverberatory furnace, containing a well or hollow in which the melted metal accumulates. It is ladled out of this receptacle into moulds, which are of various sizes and forms, according to the after-processes. The plates or slabs thus made are heated at a second furnace to about 212°, at which temperature they can be rolled into sheets by an ordinary rolling-mill. It is the facility of rolling when hot (a comparatively modern discovery) that has brought zinc so much more largely into use in recent times. Zinc is very flexible; and thin sheets, stamped and perforated sheets, mouldings and beadings, nails and spikes, wire of great flexibility — all are produced in abundance: statues, busts, and statuettes are also cut in this metal, as well as ornaments of various kinds. Vessels for containing and conveying water are another mode of use; and zinc roofing is much used, as being lighter than sheet-lead. *Zincing* is the coating of other metals with a thin layer of zinc (See GALVANIZED IRON).

Imp. duty: Zinc in blocks or pigs, $1\frac{1}{2}$ cts. per lb.; in sheets, $2\frac{1}{4}$ cts. per lb.; oxide of zinc, dry or ground in oil, $1\frac{3}{4}$ cts. per lb.; manuf. of zinc, n. o. p., 35 per cent.

Zincography, the art of obtaining impressions from plates of zinc. The practice of the art differs from that of lithography only in this, that in the latter German stones are made use of, whilst in the former method plates of zinc are employed. See LITHOGRAPHY.

Zinn [Ger.], tin; pewter.

Zircone, a peculiar and rare gray and brown earth, found in the true rough and opaque varieties of hyacinth stone, which are met with in Ceylon, Norway, Carinthia, and the Ural. The term hyacinth is applied to the transparent and bright-colored varieties of zircon, and jargoon to crystals devoid of color, and of a smoky tinge, occasionally sold as inferior diamonds.

Zitz [Ger.], chintz; printed calico.

Zoll [Ger.], a toll or customs-duty.

Zollhaus, a German custom house.

Zollverein, the union of the German States under one customs-tariff. See GERMANY (COMMERCE).

Zoological garden, a collection of foreign animals, etc., in ornamental pleasure-grounds, shown to the public.

Zymosometer, a measure of the degree of fermentation.

Zythem, a beverage made from malt and wheat.

APPENDIX.

Air-Engine. The utilization of the expansion of heated air for driving an engine has for many years been a subject which has exercised the ingenuity of inventors. The history of air-engines has, however, been little more hitherto than a history of failures, and they are as far now from superseding steam-engines as they were fifty years ago. This is owing mostly to the fact that the inventors have too often worked empirically, without any knowledge of the conditions under which, and under which only, the real advantages of the fluid could be obtained, and have therefore continually violated those conditions. There are also certain constructive difficulties in the way of making a successful air-engine which have never been fully overcome. It should be distinctly understood that, regarded simply as a medium for transforming heat into work, air possesses *no* advantage over steam or any other fluid. Its advantage is, that it can be used with safety at much higher temperature than steam (and therefore a large proportion of the heat given to it can be transformed into work), and that by employing the gases of combustion in the cylinder much heat can be utilized which with steam-engines is necessarily wasted.

Of the air-engines which have actually worked we have — 1. Those in which the changes of temperature take place at a pair of constant volumes; 2. those in which the changes of temperature take place at a pair of constant pressures; 3. those in which heat is received and rejected at a pair of constant pressures. The first two classes, fitted with "economizers," are in theory "perfect" engines; that is, they are theoretically capable of transforming into work the largest fraction the limits of temperature allow of the heat received from the fuel. The third class are not perfect engines, but possess certain practical advantages, the most important of which is the use of the products of combustion themselves, instead of merely the air heated by them, to drive the piston. The construction of the engine is very simple: the working piston is fitted with a trunk on its upper side, which, thus reduced in area, serves as a compressing pump, and the products of combustion act directly upon its under side, which is protected by a large drum, filled with non-conducting material, from the heat. The furnace stands beside the cylinder, and is entirely closed up, means being provided for feeding it with fuel without allowing any air to enter. The air compressed by the pump is delivered into the furnace, where it combines with the fuel to form the gases of combustion, and in this way receiving additional heat, expands, and raises the piston of the working cylinder for a portion of its stroke. The admission-valve of the latter is then closed, and the gases expand, without addition of heat, until the piston has completed its stroke, and are then discharged into the atmosphere. By the additiou of an "economizer," the efficiency of this type of engine may be very greatly increased; but its principal advantage is that, by actually using the products of combustion inside the engine, much heat is saved which in other engines is unavoidably sent up the chimney and lost. — One of the principal features of all air-engines is the "economizer" (sometimes erroneously called the "regenerator"), an invention of Mr. Stirling's. The object of this apparatus is to store up the heat rejected by the fluid when it fails in temperature, and subsequently to raise the temperature of the fluid by re-storing the same heat, so that the only heat which the furnace has to supply is the latent heat of expansion, together with the amount of sensible heat which may be lost through the imperfection of the economizer.

Artificial Limbs. The manufacturing of artificial limbs has received the attention of surgeons and mechanics from a very early date. In the great work of surgery, by Ambrose Paré, 1579, he refers to and gives detailed illustrations of an artificial arm and leg, and, although the construction was of a rude character, they showed a very good attempt to conceal the mutilation. In an article of May 30, 1860, in *Le Bulletin Général de Thérapeutique*, Paris, is published an account of an artificial limb invented in 1696, by Verduin, a Dutch surgeon. This model for an amputation below the knee was composed of a wooden foot, to which were fastened two strips of steel extending up to the knee. To these strips was riveted a copper socket to receive the stump; a leather for lacing round the thigh was connected to the socket by two steel side-joints, thus dividing the points of support between the thigh and stump. The construction of this leg was improved later by Professor Serre of Montpellier. Improvements and new limbs were more recently introduced in England and France by Fred. Martin, M. Charrière, MM. Mathieu and Béchard. These were mostly unprotected by patents. We next notice Mr. Thomas Mann, whose patents were issued January 20, 1790, and later in 1810. Mr. James Potts, of England, patented a new leg November 15, 1800. This soon became celebrated as the Anglesea leg, because it was so long worn by the Marquis of Anglesea. An improvement on this leg was patented by Mr. Wm. Selpho, who was the first manufacturer of note in New York, where he established himself in 1839. Other inventors and manufacturers soon took a great interest in the business — so many, in fact, that the American Patent Office shows a record of about 150 patents on artificial limbs, or more than double of all European patents on limbs. The civil war, which caused the mutilation of so many soldiers and sailors, and the liberality of the government in supplying their losses with artificial limbs, naturally stimulated the efforts of inventors in producing such substitutes as would be accepted. These soldiers and sailors are supplied once in every five years, and to this demand is added those who have lost limbs from disease or accident, making

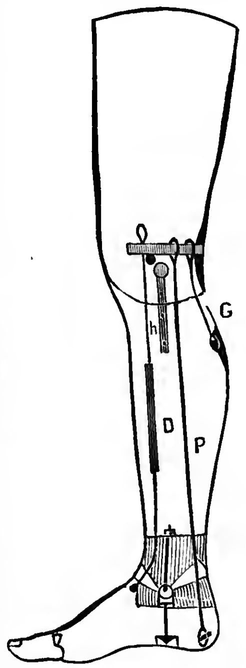

Fig. 500.

in all about 100,000 in the U. States who have to be supplied with new limbs on an average of about once every five to eight years. The manufacturing of these articles has therefore become quite an enterprise, and the number of manufacturers is very numerous throughout the whole country. The perfection to which limbs have been brought is wonderful and very interesting. A person with two artificial legs can walk so perfectly as to avoid detection, and a person with a single amputation can almost defy detection. The most recent improvements in all styles of artificial limbs, and

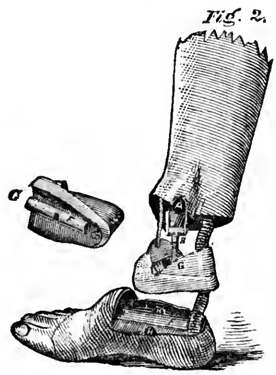

Fig. 501.

more particularly of legs, have been introduced by Mr. C. A. Frees of New York. One of these improvements, and one of the most important, consists in the movements of the knee and ankle joints, by which the whole limb is strengthened and made more durable. An important feature of this admirable piece of mechanism consists in the introduction of a universal motion at the ankle joint. Most of the leading manufacturers had previously experimented quite extensively on this movement with comparatively little success, which is probably owing to the fact that a single joint was invariably used, while Mr. Frees has copied from nature, imitating the astragalus movement with an additional joint, and thus producing the most perfect artificial substitute in use. Another of his improvements, which is of equal importance, is in the knee joint of the leg for thigh amputation, which can be readily adjusted in case of wear; and is so arranged that, when in a sitting position, the cord and spring are entirely relaxed, thus relieving all strain and pressure; and when rising to an upright position the cord and spring are again brought into their proper positions without any strain or unnatural movement, and no extra attachments are required. The accompanying illustrations, for which we are indebted to Mr. Frees, will serve to give partially the details of the construction of his artificial leg. The artificial arms and extension apparatus for short legs, manufactured by this firm, are also wonderful examples of American ingenuity.

Fig. 500 represents internal view of full-length leg. The articular surface of the joints throughout the artificial leg are steel joints plying in smoothly pressed leather sockets. The knee joints consist of two steel braces h, h, which are riveted firmly to each side of the lower leg, with top piece one inch in depth by ¾ inch in circumference, working in socket at knee. The tendon, G, limits the extension of leg at knee joint. The tendon, P, is for limiting forward motion at ankle joint, and retaining elevation on ball of foot when walking. The elastic spring, D, acts as foot spring and knee spring when leg is flexed at knee in walking; the spring, D, raises the toes about two inches while the leg is being extended, thus preventing tripping and stumbling. Fig. 501 represents sectional view of foot and ankle. A, ankle joint; B, bolt securing foot leg by means of nut at bottom of foot; C, leather bushing, in which joint A articulates. The extra block, G, is for showing the lateral articular bearings, F, F.

Black Sea or Euxine, a large inland sea, bounded W. by Roumelia, Bulgaria, and Moldavia; N. by South Russia, including Bessarabia, Kherson, and Taurida; E. by the Russian provinces of Circassia and Transcaucasia; and S. by the Turkish provinces of Asia Minor. It is entered from the Mediterranean though the channel of the Dardanelles, the Sea of Marmora, and the channel of Constantinople; and it is connected with the Sea of Azoff by the strait between the Crimea and the Isle of Taman, known by the various names of Strait of Kertch, or Yenikale, and of Taman. The basin of the Black Sea is of an irregular ovate form, its longest diameter lying nearly E. and W. Its greatest length, from the head of the Bay of Burghaz in Roumelia on the W. to the boundary between Transcaucasia and Asiatic Turkey near Batum on the E., is about 720 m. Its greatest breadth is in its western portion, between the estuary of the Dnieper on the N. and the mouth of the Sakaria on the S., where it is 380 m.; its middle portion is narrowed by the projection of the Crimean peninsula on the N. and of the coast line of Anatolia between Cape Kerempe and Sinope on the S., to 160 m.; but further E. it widens out again between the Strait of Kertch on the N. and the mouth of the Kizil Irmak on the S., to 260 m. Its total area, including the Sea of Azoff, is about 172,500 sq. m. The W. coast line of the Black Sea, for some distance N. from the Bosphorus, is high and rocky, and the water rapidly deepens from 30 to 40 fathoms. Between their N. extremity and the range of the Balkans, which extends E. and W. terminating in Cape Emineh, there is a large bay, named after the town of Burghaz at the head of it, which affords a safe anchorage for large ships, the only one on this coast. Between Cape Emineh and Varna the coast line is again low and the shore shallow; and the same condition extends, with but little interruption, along the low-lying region called the Dobrudscha, which extends to the mouth of the Danube. This great river discharges itself by seven mouths, among swampy islands and shifting banks; and the quantity of *detritus* brought down by it is so large as not only to form a very extensive bar, but also to require the continual use of artificial means for its removal from the bed of the navigable channels. The same low coast-line continues along the S. boundary of the Russian steppes, to the shallow inlet which forms the estuary of the Dniester, and of which the mouth is nearly closed by a bar; beyond which, towards Odessa, the coast-line is more lofty, and the waters deepen more rapidly, so that it has been possible to construct a harbor in which ships of considerable tonnage can lie securely. Between Odessa and the mouth of the Dniester the shore again becomes low, and the water shallow; and the outlet of that river, which also receives the River Bog or Bug, is a long, shallow bay bordered by shifting sand-banks, which is called the Gulf of Leman or the Bay of Kherson. Only ships of light draught of water can navigate these rivers, of which the Bug is the deeper; and vessels of war, which are built and repaired at the arsenals of Kherson and Nicolaieff, are artificially floated up and down. The Crimean peninsula is separated from the mainland on the W. side by the Gulf of Perekop, the N. boundary of which is formed by

a narrow belt of sand that runs nearly straight for a distance of 80 m. The inner portion of this gulf is so shallow that only vessels of very light draught can make their way to Perekop, which is situated on the narrow isthmus that divides it from the Sea of Azoff. Along the W. coast of the Crimea, however, the coast-line gradually rises, and the shore deepens more rapidly; and at Eupatoria there is a good harbor for ships of moderate size. S. of Eupatoria, the coast is formed by cliffs, sometimes of considerable height; and the water is deep almost to their base. The harbor of Sebastopol is a deep inlet, subdividing into several branches, in any one of which the largest vessels may find good anchorage, and lie within a cable's length of the shore. Between Sebastopol and Cape Chersonese are six other bays running inland parallel to each other; and on rounding this we arrive at the harbor of Balaclava, which is a remarkable inlet, having a very narrow entrance, and almost entirely surrounded by lofty heights. E. from Balaclava there commences an almost continuous chain of lofty cliffs, with mountains behind them, whose height ranges from 4,000 to 5,800 ft. Along the whole S. E. coast of the Crimean peninsula the water is deep; but there is no good harbor between Balaclava and the Bay of Kaffa, which furnishes an excellent and sheltered anchorage for large vessels. The peninsula of Kertch and the island of Taman, which separates the Sea of Azoff from the Black Sea, are for the most part low and sandy. The *Sea of Azoff* may be considered as a wide, shallow estuary of the river Don, which discharges its waters into the N. E. prolongation of the sea, sometimes distinguished as the Gulf of Taganrog; its area is about 14,000 sq. m.; and its depth, which is nowhere more than 7½ fathoms, diminishes near the shores to 4½ fathoms, and is less than 2 fathoms opposite the town of Taganrog. The whole of the portion of South Russia that lies between the Dnieper and the Don is an almost unbroken *steppe*, but very little elevated above the sea-level; and there are abundant indications of its having been at no remote period covered by salt water. The like features prevail over the plain which lies between the Don and the Kuban, and which forms the E. boundary of the Sea of Azoff. The island or peninsula of Taman, which forms the E. boundary of the Strait of Yenikale, is for the most part an expanse of salt-marshes and lagoons, into which the river Kuban discharges itself, — one portion of its water passing into the Sea of Azoff and the rest into the Black Sea. At Anapa, a little to the E., the Caucasian range comes down to the sea; and thence around the shore of Circassia, the coast-line is high with a mountainous background, and the water rapidly deepens. As the great mountain range trends inland, however, the coast becomes lower; and the region termed Mingrelia is a fertile plain, through which run the river Rion, having the important port of Poti at its mouth, and the Khopi, at the mouth of which is Redout Kale. Through these channels the merchants of Tiflis export the produce of the interior, and import European goods. Passing the boundary between Russia and Turkey, the coast-line begins to trend westwards, to the outlet of the large river Chouruk, where the fortified town of Batoum is situated at the base of the N. mountain range of Asia Minor. This range extends, with occasional interruptions, along the whole S. coast of the Black Sea, sending down spurs that form headlands and promontories, sometimes of considerable height. Owing to the steepness of the shores, there are few good anchorages here, except in the Bay of Samsoun, which receives the river Yeshil, and the Bay of Sinope, which receives the Kizil-Irmak, — at the mouths of which rivers there are plains formed by their alluvial deposit. From Cape Injeh W. to the Bosphorus, the coast-line of Anatolia is continuously elevated, with high mountains in the background, occasionally projecting seawards as lofty promontories, of which Cape Kerempe is the most noteworthy; numerous rivulets come down from the mountains, and discharge themselves into little coves; but excepting the Sakaria, there is no considerable river, and the water deepens very rapidly to 20 fathoms or more. — Although it is known that the depth of the central part of the basin of the Euxine reaches 1,070 fathoms, the extent of this deep depression is not known. The increase of depth off the low-lying W. and N. W. shores is very gradual and regular, the lines of 20, 30, and 60 fathoms maintaining a general parallelism to the coast, — so that within this range the distance of a ship from land can be approximately ascertained by sounding. But outside the 60 fathom line the bottom deepens more rapidly and less regularly, depths of from 600 to 700 fathoms being met with in some parts within a few miles of it. The depth of the E. portion of the basin has not been ascertained, but it is probably considerable. — The basin of the Euxine communicates with that of the Sea of Marmora by the Bosphorus, a strait about 20 m. long, from ¾ to 2¼ m. wide, and a depth of from 30 to 40 fathoms, resembling a broad river with high banks, which maintain a general parallelism, although the strait has seven distinct reaches. The region on either side presents distinct evidence of recent volcanic action. — The Sea of Marmora lies in the course of the channel that connects the Black Sea with the Ægean. Its bottom is depressed to a depth far greater than that of the channel of which it is an expansion. Its length from strait to strait is 110 geographical miles, and its greatest breadth is 43 m. Round the shores, the depth generally ranges from 10 to 30 fathoms; but it rapidly increases in most parts; and depths of 100, 133, 266, and even 355 fathoms have been met with, chiefly near the line connecting the two straits. — The channel which connects the Sea of Marmora with the Ægean is properly termed the Hellespont, — the name Dardanelles, by which it is commonly known, being really that of the fortifications erected on the two sides of the strait by which its passage is guarded. The Sea of Marmora narrows to a breadth of ten miles towards the N. E. entrance of the channel; at Gallipoli, the distance between the two shores suddenly contracts to about two miles; and between this and the Ægean end of the strait, that distance is further diminished at certain points to even less than a mile. The depth of the channel is considerable, being for the most part between 30 and 50 fathoms. — The *winds* of the Black Sea are variable, except during summer, when they generally blow from the N. E., while at other seasons southerly or southwesterly winds often prevail. The area is very subject to fogs, which appear to proceed from the precipitation by a cold northerly current of the moisture which has been raised by evaporation from its surface, or has been brought thither by S. or S. W. winds. This sea is remarkable for the rapidity with which violent storms not unfrequently arise, often to subside again with like rapidity.

Bonesilate, a new material which can be polished and colored, and is said to be harder than celluloid. Its basis is bone-dust. It is used at Newark, N. J., for buttons, door-knobs, billiard

balls, and other articles now made of ivory and hard rubber.

Central R.R. of New Jersey runs from Jersey City to Phillipsburg, N. J., 73.40 m.; branch lines, 56.96 m.; leased lines, 265.25 m.; total length of lines operated, 395.60 m.

This Co., whose offices are in New York city, was organized in 1849; the main road was completed in 1864, and the branch from Elizabeth to Newark opened in 1872. The Newark and New York R.R., which now belongs to the Co., was opened in 1869. The several leased roads making the Long Branch division were opened for through traffic in 1875. The line from High Bridge to Port Oram, an extension of the High Bridge Branch R.R., was opened through in 1876. It is owned by this Co. The South Branch R.R. (leased), from Somerville to Flemington, was opened in 1864. The Co. also operate, under a lease from the Lehigh Coal and Navigation Co., dated March 31, 1871, the Lehigh and Susquehanna R.R. in Pennsylvania. The equipment of this road was purchased by the lessees, and the lines of the lessors and lessees are now practically one property. The Delaware and Bound Brook R.R., opened May 1, 1876, connects this road with the North Pennsylvania, and is operated under a tripartite agreement of the companies interested. Capital stock, $18,563,200; funded debt, $31,850,276; floating indebtedness, $4.203,658.01; total stock, bonds, and debt, $54,617,634.01. *Per contra:* Maine line, and Newark and Perth Amboy branches, $13,796,742.97; stations at Jersey City, Port Johnston, and Elizabethport, etc., $3,364,892.68; equipment, $2,851,370; total cost of property as stated, $20,013,005.65.

Cincinnati, Hamilton, and Dayton R.R. runs from Cincinnati to Dayton, O., 59.93 m., and from Hamilton to Indianapolis (Cincinnati, Richmond, and Chicago R.R. purchased in 1872), 98.40 m.; lines leased (Dayton and Michigan, Cincinnati, Richmond, and Chicago, Richmond and Miami), 18.271 m.; total length of road operated, 341.04 m.

This Co., located in Cincinnati, was chartered in 1846, and the main road was completed in 1848. Cap. stock, $3,500,000; funded debt, $2,735,000; floating debt, $754,350; total liabilities, $6,989,350. Cost of construction, $3,828,066; equipment, $1,121,250; real estate, $371,543; all other assets, $3,114,040; total property and assets, $8,434,899.

Cincinnati, Lafayette, and Chicago R.R. runs from Kankakee, Ill., to Templeton, Ind., 56.3 m.

This Co., located at Lafayette, Ind., was organized in 1870, and the road was opened in 1872. Cap. stock, $1,929,200; funded debt, $1,898,000: floating debt, $300,000. Total stock, bonds, and debts, $4,059,000, representing cost of constructing and equipment.

Cincinnati, Sandusky, and Cleveland R.R. runs from Sandusky to Springfield, O., 130.15 m.; branch from Carey to Findlay, 15.51 m.; Columbus, Springfield, and Cincinnati R.R., leased at perpetuity, 44.37 m.; total length of lines operated, 190.03 m.

This road was sold in foreclosure in 1866, and a new Co. was organized under the name of Sandusky and Cincinnati R.R. Co., which Co. took the present title in 1868. Cap. stock, $4,434,787 (common, $4,005,750; preferred 6 %, $429,037); funded debt, $2,429,725; total, $6,864,512. Cost of construction and equipment, $6,219,251; stock of the C., S., and C. R.R., $763,900; total, $6,983,151.

Cincinnati, Wabash, and Michigan R.R. runs from Anderson to Goshen, Ind., 109.54 m.

This Co., located at Elkhart, Ind., is the consolidation in 1871 of Warsaw, Goshen, and White Pigeon, and Grand Rapids, Wabash, and Cincinnati R.R. Cos. The road, opened in 1876, was placed in the hands of trustees in 1878. Cap. stock, $1,450,000; funded debt (1st mortgage, 7 % bonds), $2,000,000. Cost of road and equipment, $3,418,500.

Cleveland, Columbus, Cincin., and Indianapolis R.R. runs from Cleveland to Columbus, 138 m.; from Galion, O., to Indianapolis, Ind., and from Delaware to Springfield, O., 50 m.; leased line (Cincinnati and Springfield R.R.), 80 m.; total length of lines operated, 471.70 m.

The Cleveland, Columbus, and Cincinnati R.R. was chartered in 1845, and was consolidated in 1868 with the Bellefontaine R.R. Co. under present name. The Co. is located at Cleveland. Cap. stock, $15,000,000; funded debt, $6,109,000; total, $21,109,000. Cost of construction, $17,998,527; stocks, bonds, etc., in hands, $3,806,641; total, $21,805,168.

Cleveland, Mount Vernon, and Delaware R.R. runs from Hudson to Columbus, O., 144.04 m.; leased line (Massillon and Cleveland R.R.), 12.50 m.; total length of line operated, 156.54 m.

Chartered in 1851, as Akron branch of Cleveland and Pittsburg R.R. Co., and road opened from Hudson to Millersburg, 61 m., 1853, when it was reorganized under the title of Cleveland, Zanesville, and Cincinnati R.R. Co. Placed in the hands of a receiver, 1861, and sold under foreclosure, 1864, to P., Ft. W., and C. R R. Co., by whom it was leased July 1, 1869, to the Pennsylvania R.R. Co. It was sold by the latter Co. Nov. 4, 1869, to the Pittsburg, Mount Vernon, Columbus, and London R.R. Co., already operating 65 m. of road; and Dec. 20, 1869, the present title was taken on consolidation of the two companies. The road as now stated was completed in 1873. — Cap. stock, $1,768,798 (common, $1,317,348; preferred, $451,450); funded debt and coupons, $3,411,750. Cost of construction and equipment, $4,837,018.

Cleveland and Pittsburg R. R., runs from Cleveland to Rochester, Ohio, 133.77 m.; from Yellow Creek to Bellaire, 43.25 m.; and from Bayard to New Philadelphia, 32.75; total length, 199.77 m.

This Co., located in Cleveland, was chartered in Ohio in 1836, and in Pennsylvania in 1845, and the road and extensions were completed and opened in 1872. The road is rented to the Pennsylvania R. R. Co., for 999 years, at a rental of 7 per cent on capital stock, interest on bonds, sinking fund, and $10,000 a year for organization. Cap. stock, $11,244,036; funded debt, $5,059,343; balance, old income account, $384,905; balance guaranteed income account, $348,309; other liabilities, $381,-818; total liabilities, $17,418,411. Cost of construction and equipments, $16,488,718; other assets, $929,693; total property and accounts, $17,418,411.

Cotton-Seed Oil, and CAKE, a drying oil, extracted by machinery from cotton-seed, and used in the manufacture of soap, as a substitute for olive oil, as a lubricator, for illuminating purposes, and as a substitute for linseed oil in mixing paints. The cotton-seed oil exported from the U. States in 1879 (chiefly to France, Italy, and England) amounted to 5,352,530 gallons, valued at $2,232,-880. After the seed has been ground and the oil extracted therefrom, the refuse is formed into *cotton-seed cake*, a very useful article of food for cattle as a substitute for linseed oil cake. Cotton-seed cake is largely exported to Great Britain, where it is used for feeding cattle.

Fisheries. The great sea-fisheries of the U. States are mostly carried on from the ports of New England, and from the ports of the Pacific, N. of California, the fisheries of Alaska being particularly of vast extent and great productiveness. The following table exhibits the tonnage employed in 1879, in the cod and mackerel fisheries: —

States.	No. of vessels.	Tons.
Maine	669	19,358.82
New Hampshire	29	1,032.10
Massachusetts	941	41,734.59
Rhode Island	139	2,794.61
Connecticut	195	4,834.50
New York	441	7,886.42
New Jersey	1	24.59
Pennsylvania	1	5.17
Virginia	1	20.47
California	27	2,123.41
Oregon	1	70.46
Grand total	2,445	79,885.14

According to a statement published in 1880 by the chief of the bureau of statistics, the product of all American fisheries (the whale excepted), for the year 1879, was as follows: —

Product.	Quantity.	Value.
Codfish, cured.................cwts..	318,731	$1,054,578
Mackerel, cured................do....	188,713	664,664
Herring, cured.................do....	59,254	111,209
Other fish, cured...............do....	115,616	224,755
Oysters ....bushels..	25,500	21,157
Other shell-fish......................	....	228,673
Fresh fish, not shell-fish.....pounds..	45,711,077	798,641
Oils, other than whale.......gallons..	2,483,063	784,439
Shell and bone, other than whalebone.	....	2,135
Teeth......................pounds..	48,000	10,121
Skins......................number..	11,860	56,070
Manure.......................tons..	47,089	508,779
All other products of American fisheries	....	55,829
Total..........................	....	$4,521,050

The information, however, is very incomplete, owing to the fact that there is no law requiring all products of the fisheries to be reported to the custom-offices when landed within a customs-district. It was compiled chiefly from information obtained through the personal efforts and inquiries of the custom-officers of several ports from which it is practicable to obtain returns. See COD, MACKEREL, HERRING, HALIBUT, SALMON, SEAL, etc., and WHALE FISHERY, in body of the work.

Northern Pacific R. R., runs from Duluth, Minn., to Bismark, Dakota Territory, 449 m.; Pacific Division, 136.5 m.; leased line (Western R. R., from Brainerd to Sauk Rapid, Minn.), 60.5 m.; total length of lines operated, 646 m.

The Co. was chartered by act of Congress approved July 2, 1864, and empowered to construct a railroad and telegraph from Lake Superior to Puget Sound, about 1,800 m., with a branch to Portland, Oregon, about 200 m. By the act the company received a land-grant of 20 sections to the mile within State limits, or 40 sections in Territories, aggregating by estimate 47,000,000 acres. The first part of the road undertaken, from Duluth to the Red River of the North, 253.5 m., was completed in 1870. The Dakota Division — Red River to the Missouri, 195.5 m., was opened in 1873, and the Pacific Division, Tacoma to Kalama, 105.5 m., in 1874. The Puyallup Branch, Tacoma to Wilkeson coal fields, 31 m., was opened in the fall of 1876. The company defaulted on its interest Jan. 1874, and the property passed to a receiver's hands in April, 1875. The road was sold in foreclosure to a purchasing committee representing the bondholders, who on Sept. 29, 1875, organized themselves into the existing corporation. The Western Railroad was leased from May 1, 1878, for 99 years at 35 per cent of gross earnings for 5 years, and 40 per cent. thereafter, with a guaranty of 7 per cent on the lessors' bonds, not to exceed $10,000 per mile of road. — Cap. stock, $100,000,000; assets acquired under decree of Court, $44,968,370; land receipts, $5,046,636; other liabilities, $1,543,948; total liabilities, $151,518,954. Preferred stock not issued $7,988,732; first mortgage bonds, etc., surrendered, $27,602,997; preferred stock issued as provided in reorganization, $4,562,611; interest on bonds surrendered, $10,906,821; common stock not issued, $22,877,700; stock of former organization surrendered, $23,918,900; common stock to complete subscriptions, etc., $2,203-400; preferred stock and scrip on land sales, $5,093,524; construction, 19,588,650; equipments, $1,115,369; trustees of land 406; $735,000; connecting lines, $606,951; lands, $23,725,-stocks, other assets, $592,893; total assets, $151,518,954. The principal office of the Co. is in New York city.

Oyster, a well-known edible shell-fish, belonging to the genus *ostrea*, occurring in most parts of the world. The European oyster (*O. edulis*) which forms a considerable article of trade on the coasts of England and France, is taken by dredging, after which the animals are placed in pits formed for the purpose, furnished with sluices, through which, at spring tides, the water is suffered to flow. In these receptacles they acquire the green tinge so remarkable in the European oyster, and which is considered as adding to their value. This color, which at one time was supposed to be owing to some mineral impregnation, has recently been ascertained to arise from the *confervæ*, and other marine vegetable matter, on which the animal feeds. The breeding-time of oysters is in April or May, from which time to July or August the oysters are said to be *sick*, or *in the milk*. This is known by the appearance of a milky substance in the gills. Oysters attain a size fit for the table in about a year and a half, and are in their prime at three years of age; though what the natural term of their lives may be, it is difficult, if not impossible, to determine with any degree of accuracy. Many curious discussions have arisen as to whether oysters possessed the faculty of locomotion. It is well known that, in general, they are firmly attached to stones, or to each other; and it has been stated, and generally believed, that they were not endowed with any powers of changing their position. From the observations and experiments of naturalists, however, it appears that they can move from place to place by suddenly closing their shells, and thus ejecting the water contained between them with sufficient force to throw themselves backward, or in a lateral direction. Oysters form the basis of many culinary preparations, but are much more digestible in their raw state than after any mode of cooking them, as this process, in a great measure, deprives them of the nourishing animal jelly which forms so large a portion of their substance. The shell of the oyster is composed of carbonate of lime and animal matter, and was at one time supposed to possess peculiar medical properties; but analysis has shown that the only advantage of these animal carbonates of lime over those from the mineral kingdom arises from their containing no admixture of any metallic substance. The lime obtained from the calcination of oyster-shells, though exceedingly pure and white, is better suited for work which does not require great tenacity, as for plastering rooms, than for the common purposes of building, as it does not form as hard a compound with sand as the mineral limes.

"The oyster most esteemed in America," says the *Am. Cyclopædia*, "are the Virginian oyster (*O. Virginiana*), and the Northern oyster (*O. borealis*). In the *O. Virginiana* the shell is elongated and narrow, and the beaks pointed and not much curved; the surface of the smaller and upper valve when not worn presents everywhere leaf-like scales of a leaden color, and a lengthened pyramidal hinge ridge along the beak; the muscular impression is nearly central, and of a dark chestnut or violet color; it often measures 12 to 15 in. in length, but is rarely more than 3 in. wide. This is the common oyster from Chesapeake Bay southward; it is sometimes found in the vicinity of Boston, and also at the mouth of the River St. Lawrence; it multiplies so rapidly on some of the low shores of the Southern States as to offer impediments to navigation, and to change the course of tidal currents. In the *O. borealis* the shell is more rounded and curved, with the beaks short and considerably curved; the surface is very irregular, presenting loosely arranged layers of a greenish color, with the margins more or less scalloped; the muscular impression is dark violet, and the interior chalky or greenish white; a common size is 5 or 6 in. long, but it grows to the length of a foot and to a width of 6 in. This is the common New York oyster, said also formerly to have been abundant in Massachusetts Bay. Boston market is supplied principally from artificial beds derived from the Virginia and New York oysters; the flats in the vicinity of our maritime cities are generally thickly beset with poles, indicating the localities of oyster beds. The principal sources of supply are the Chesapeake Bay, the coast of New Jersey, and Long Island Sound. Formerly the northern beds were almost wholly kept up by restocking them with seed oysters from Chesapeake Bay and from the Hudson River; but of late years the spat is secured at spawning time, and new ground in the vicinity is brought under cultivation, till the area of oyster beds in Long Island Sound is now computed by miles rather than by acres, and it is yearly extending. With constantly improving methods of culture, means are also devised for protecting the oyster to some extent from its natural enemies, and for transporting oysters to the remotest parts of the country." Prices for large-sized oysters have slightly advanced of late, owing to the growing shipments to Europe, which are wholly composed of little, or "seed" oysters. There is no demand for larger ones across the water, and there has been a heavy drain upon the older beds for the last few years for home consumption, while thousands of barrels were sent abroad that would otherwise have been left to grow. The largest bivalves, which are still called "Saddle Rocks" by courtesy, will be worth from $15 to $30 a thousand. Saddle

Rock is in the East River beyond Hell Gate, and the oyster beds there are exhausted pretty nearly, while those that bear their title are "Blue Points," from Great South Bay, Long Island. Even Blue Points are mainly transplants from the East and Hudson rivers and from Virginia, but all are classed under one name when they are taken up for the market. "Box" oysters, which are next in size to the Saddle Rocks, will cost from $8 to $10 per thousand, and "gallon" oysters, as they call the little ones that are sold by the gallon, will range in price from $3.50 to $5. The oyster trade has developed itself in this country by slow degrees at first, and last by rapid strides, to immense and wonderful proportions. No trustworthy statistics can be given of the oyster area or annual product, or the amount of money invested, or number of men and vessels engaged in the business; but the value of the oyster sales has been carefully estimated to about the following figures: New York, $30,000,000; Baltimore, $30,000,000; Philadelphia, $8,000,000; Norfolk, Va., $5,000,000; elsewhere in the U. States, $5,000,000; total, $75,000,000. Until 1880, Baltimore's trade in oysters had surpassed that of New York, but it is now thought that New York ranks first. New York does very little canning or pickling, Baltimore does little else. The means for transporting fresh bivalves have improved so fast that canned oysters are on the decline. In Baltimore thousands of people are employed in the business of canning during the months of Oct., Nov., and Dec. They deal in Virginia oysters altogether, which are giving place in popular favor to the stronger-flavored bivalves from New York. The summer trade is confined almost exclusively to Virginia oysters, which hold their spawn better than our native oysters. It is estimated that 50,000 people are in some way employed in the oyster trade in New York during the busy season. Of the $30,000,000 annual business about two-thirds is done in the city of New York, and the greater part of the remainder is done between here and Chicago. Oysters are not often shipped beyond the latter place, though they have occasionally been sent to California. Some dealers in San Francisco, where the Eastern oyster is preferred to the native, have lately ordered seeds from here, which thrive very well on the rocky bottoms of the Pacific. Last year over fifteen thousand barrels of seed oysters were sent there for replanting. The foreign market for American bivalves was established with difficulty. Mr. Boyle was one of the first to undertake it, and met with the greatest opposition. He had almost given it up when an English vessel came after a cargo of Virginia oysters for replanting, but they died on the voyage. This stimulated new shipments from here, and the business succeeded. There are branch American oyster depots now in London, Liverpool and Havre. For the year 1879, the value of oysters exported, chiefly to England, was $453,306.

Portugal (wines of). Port wine, the Portuguese wine of commerce, is so called from the town of Oporto, near the mouth of the river Douro. The Douro region producing the finest wines comprises the slopes of the mountains bordering the river of the same name in its course from the Spanish frontier to the province of Minho, and it is on the hilly banks of a tributary stream, named the Corgo, that the Port wine vineyards — the soil of which is extremely stony, due to the friability of the slaty schist rock of which the hills are formed — are principally situated. The vine is cultivated over an area of 76,314 acres, and the principal variety of grape are the Alvarelhâo, the Bastardo, or Morillon, the Touriga, the Gouveio, and the Souzâo, the latter yielding a wine deficient in flavor and bouquet, but extremely deep in color. The Douro region is estimated to yield altogether rather more than 11,000,000 gallons of wine annually. Official returns give the produce of the Villa Real district, which is understood to comprise all the finest vineyards, at 62,942 pipes, which would be equivalent simply to 7,238,330 gallons. Of these, 6,067,526 gallons were exported. The Portuguese official returns for 1870 estimate the average value of the Port wine exported to England in that year at $1.68 per gallon. The Alto-Douro, or Corgo district, has given for the last forty years a larger number of fine vintages than any other district producing first-class wines. In 1872 the imports of Port wines into England was 4,018,113 gallons, exhibiting an increase of no less than 36 per cent within the short space of four years. In the same year the consumption amounted to 3,298,015 gallons, being 103,000 gallons in excess of that for the year 1871. There was a further increase in 1874, when the consumption rose to 3,626,683 gallons, equal to 21 per cent of the entire wine consumption of Great Britain. The direct exportation to the U. States is very small, and consists generally of wines of inferior quality, the returns for the year 1879 being 21,339 gallons, valued at $24,466. The most part of the so-called Port wine consumed in this country comes to us from England. Port, as known in England and here, is at its best a dull, heady wine, depth of color and a certain fulness and roundness being its principal merits, for its bouquet, in lieu of the fragrance of fruit or flowers, has too often an odor of ardent spirits, while its warmest admirers would never claim for it either raciness or freshness of taste. It is, moreover, equally deficient in *finesse*, is altogether lacking those subtle gradations and that refined harmony of flavor, that combined freshness and softness, which distinguished the grand *crûs* of the Haut Médoc; added to which, unlike those unique wines, it leaves neither the head cool nor the tongue fresh. From the latest and most reliable information it results that the fortifying of the higher class of Ports is carried on to the same extent as formerly, partly possibly because it is a kind of tradition with the growers and shippers that a high spirituous quality is looked for in Ports by foreigners generally, partly to disguise the extreme roughness of the inferior vintages, but mainly to make up for a clumsy mode of vinification, and to render the wine quickly marketable. Fermentation is more or less checked by the addition of sulphur, so as to retain the saccharine (which would otherwise become converted into alcohol), and give a so-called fruity character to the wine. Extraneous alcohol has now to be added, otherwise the wine would have to be kept for two or three years before it could be shipped with safety, instead of merely a few months, as is the case at present. It has been satisfactorily proved that Port wine, if sufficiently fermented, will not only travel, but will keep as long as most natural wines will keep without deteriorating — namely, 16 or 17 years — and yet we find the reports of unbiassed observers of some years ago, which agreed in stating that all wine destined for exportation was largely fortified, confirmed at the present day by the wines themselves. Mr. Bernard, who visited the Alto-Douro district for the British government, estimated the amount of spirit ordinarily added to Port wine at 22 per cent, or a trifle more than 25 gallons per pipe. Baron Forrester, who was himself a grower, estimated it rather higher, namely, 26 gallons of spirit several degrees over-proof; while other authorities consider 49 gallons of adventitious proof spirit per pipe to be nearer the standard of the Port wine ordinarily imported into England. One significant fact, to which attention cannot be called too often, is that less than 10 years ago, Portugal, which is not a dram-drinking nation, took upwards of 1,600,000 gallons of British spirits. It is true that it does so no longer, but simply because Prussia, where it markets to-day, furnishes it with a cheaper article distilled from potatoes and beetroot. It is notorious, moreover, that spirit of the same low class is extensively used in England to fortify Port wine in bond. — The Douro wine-growers have adopted vines, the fruit of which imparts depth of color and body, to the sacrifice of *finesse*, and yields an amount of tannic acid, and requiring considerable age for the thorough development of the wine. If a preference were only given to that class of vines the product of which is distinguished by *finesse*, there would be

no reason whatever why the Douro growths, with the manifest advantages of climate which Portugal possesses, should not rival the grand wines of the Gironde. This, however, is scarcely likely to happen while so large a market is found for her fortified products. Moreover, the Douro wine-grower is too indolent, too slow of apprehension, and too short-sighted to look beyond the immediate present. The merits of the higher class of natural Port wines, — that is to say, free from added alcohol — are their deep and brilliant color, their volume, and their remarkable vinosity. Some of them exhibit as high as 27° of proof spirit, proving the utter absurdity of dosing Port wine with alcohol. A few years suffice to subdue their youthful harshness, to give them a fine, high, vinous flavor, and to develop the highly prized violet bouquet, which only wines of undeniable character ever evolve. — No wine is imitated so extensively as Port. It came out in evidence 20 years ago that the average quantity annually exported to England was 20,000 pipes, while the annual consumption amounted to no less than 60,000 pipes. And at the enquiry before the parliamentary committee reporting the import duties on wines, it was shown that certain counterfeit Ports were concocted out of Cape wine, cider, and brandy; others with common French, Spanish, and Sicilian wines, with a liberal admixture of raw spirit.

Madeira, so called from the island of that name, is a wine that has long been in high esteem in this as in other countries. There is a great difference in the flavor and other qualities of the wines of Madeira; the best are produced on the S. side of the island. Though naturally strong, they receive an addition of brandy when racked from the vessels in which they have been fermented, and another portion is thrown in previously to their exportation. This is said to be required to sustain the wine in the high temperature to which it is subjected in its passage to and from India and China, to which large quantities of it are sent; it being found that it is mellowed, and its flavor materially improved by the voyage. It does not, however, necessarily follow that the wines which have made the longest voyages are always the best. Much must obviously depend on the original quality of the wine; and many of the parcels selected to be sent to India are so inferior, that the wine, when brought to market, does not rank so high as that which has been imported direct. But when the parcel sent out has been well chosen, it is very much matured and improved by the voyage; and it not only fetches a higher price, but is in all respects superior to the direct importations. Most of the adventitious spirit is dissipated in the course of the Indian voyage. Madeira wines may be kept for a very long period. "Like the ancient vintages of the Surrentine hills, they are truly *firmissima vina*, retaining their qualities unimpaired in both extremes of climate, suffering no decay, and constantly improving as they advance in age. Indeed, they cannot be pronounced in condition until they have been kept for 10 years in the wood, and afterwards allowed to mellow nearly twice that time in bottle; and even then they will hardly have reached the utmost perfection of which they are susceptible. When of good quality, and matured as above described, they lose all their original harshness, and acquire that agreeable pungency, that bitter sweetishness, which was so highly prized in the choicest wines of antiquity; uniting great strength and richness of flavor with an exceedingly fragrant and diffusible aroma. The nutty taste, which is often very marked, is not communicated, as some have imagined, by means of bitter almonds, but is inherent in the wine." (*Henderson*, p. 253). — The wines of Madeira have lately fallen into disrepute in England and in America. The growth of the island, when greatest, was very limited, not exceeding 20,000 pipes, of which a considerable quantity went to the West Indies and America. Hence, when Madeira was a fashionable wine every sort of deception was practised with respect to it, and large quantities of spurious trash was disposed of for the genuine vintage of the island. This naturally brought the wine into discredit; so that sherry has been for several years the fashionable white wine. It is difficult, however, to imagine that adulteration was ever practised to a greater extent upon Madeira than it is now practised upon sherry. It is not, therefore, improbable that a reaction might have taken place in favor of Madeira, had not its growth been nearly extinguished for several years by the odium. In 1870 Madeira produced 6,000 pipes of wine of all kinds, equal to 552,000 gallons, of which it exported nearly 95,-300 gallons. In 1879, the production had risen to 10,000 pipes.

Malmsey, a very rich, luscious species of Madeira, is made from grapes grown on rocky grounds, exposed to the full influence of the sun's rays, and allowed to remain on the vine till they are over-ripe.

San Francisco, the most important city of California, and the principal commercial emporium on the Pacific coast of America, in lat. 36° 47′ N., lon. 122° 24′ W. The entrance to the Bay of San Francisco, known as the Golden Gate, is about 3 m. wide, and is formed by a gap or opening, extending 5 or 6 m. through the range of mountains that runs along the coast of California. Table Hill, not far from the N. shore of this strait, is 2,500 ft. high. Opposite the entrance, just as it opens into the bay, are the islands of Alcatraz and Yerba Buena. 30 m. in the distance, nearly due W., rises the peak of Monte Diablo, the highest point of the second or interior coast range, and overlooking everything between the ocean and the Sierra Nevada. It is between these two coast ranges that the Bay of San Francisco spreads out, extending in a direction E. of S., upwards of 50 m., with a breadth varying from 6 to 7 m., where it turns S., to near 20 m. in the middle, and diminishing to 2 or 3 at the S. extremity, into which flows the Guadaloupe River, on which, and on the shores of the bay, is some excellent land. At the N., the Bay of San Francisco communicates by a strait not unlike that of the Golden Gate, with San Pablo Bay, a basin of near 15 m. diameter, into which are discharged, through a deep, navigable channel coming from the W. and extending in its course into Suisun Bay, the united waters of the Sacramento and San Joaquin, the two principal rivers of California. The peninsula between San Francisco Bay and the ocean consists chiefly of barren sand hills. The city lies just within the N. point of the entrance into the bay, upon a deep curve of the shore, and on the sides of three hills of sand, which rise steeply from the water, the middle one receding so as to form a bold amphitheatre. It is regularly laid out, and possesses many remarkable buildings, among which are the new city hall, custom-house, Grand Opera House, Merchants' Exchange, mint, Bank of California, and the Palace Hotel, the largest building of the kind in the world and the most complete in its appointments; it is 275 by 350 ft. on the ground, nine stories high (counting two below the level of the street), can accommodate 1,200 guests, and cost

with land and furniture $3,250,000. The climate is mild, healthy, and peculiar. The mean temperature of January is 49° F., of July 57°, and of the year about 56°. The summer here is so cool that people come to the city from the interior to escape the heat.

The harbor has an entrance 35 ft. deep at low tide. It is the only large, deep and secure harbor on the Pacific coast between Victoria and Mazatlan, a distance of 2,000 m., except that of San Diego. In consequence of this advantage, and of its ready communication with the interior, it enjoys a monopoly of the commerce of the Pacific slope, and is distinguished by its immense accumulation of capital, its large financial operations, and its speculation in mining stocks. Many of the gold and silver mines of California, Nevada, Colorado, Wyoming, and Arizona are owned by citizens of San Francisco. The railroads which terminate on the Bay of San Francisco are the Central Pacific, the California Pacific, the North Pacific Coast, the San Francisco and North Pacific, and the Southern Pacific, of which the last named alone terminates in San Francisco, while the others are directly connected with the city by steam-ferries. About 50 ocean steamers run from the port in regular lines to Japan, Australia, Panama, Mexico, Victoria, and domestic ports in California and Oregon, and a score of light steamers to various parts on the inland waters that have their outlet at the Golden Gate. In 1879, San Francisco exported $26,218,171 of treasure, of which $9,197,-549 was for China, and $15,941,045 to New York for shipment to Great Britain, etc. The value of merchandise exported by sea in the same year was $35,548,417. The principal articles of exports and imports were as follows: *Quicksilver*, receipts for the year, 70,360 flasks, of which 52,180 flasks, valued at $1,520,856, were exported by sea, and 10,637 flasks (of 90½ lbs. each) were shipped by rail. *Wine*, exported by sea, 1,401,438 gals., valued at $755,444; forwarded by rail, 679,916 gals. *Salmon*, packed 539,600 cases, of which 134,578 packages valued at $661,258 were exported by sea, and 6,487,470 lbs. shipped by rail. *Coffee*, imports 12,393,822 lbs., valued at $1,791,922; exported by sea, 514,711 lbs.; shipped by rail, 2,822,965 lbs. *Sugar*, imports 54,487,442 lbs., valued at $3,-369,339, of which the Hawaiian Islands contributed 46,682,801 lbs. The product of beet sugar for the year was about 800,000 lbs. *Rice*, imports 48,811,107 lbs., valued at $1,411,049; exports by sea, 1,857,423 lbs.; by rail, 409,300 lbs. *Wool*, receipts for the year 54,049,555 lbs.; exported by sea 12,731,297 lbs., valued at $2,313,959; shipped by rail 37,379,044 lbs., valued at about $6,000,000. *Lumber*, received 212,151,817 ft.; exported to foreign ports 10,501,075 ft., valued at $316,485. *Tea*, imported (including transit) 19,977,672 lbs., valued at $6,324,982, of which Japan furnished 14,092,816 lbs., and China 5,884,876 lbs. *Wheat*, exports 10,540,197 centals, valued at $19,258,457. *Flour*, exports 511,600 barrels, valued at $2,586,486. *Coal*, imported 618,094 tons, of which 38,365 tons from England, 80,175 tons from Australia, 160,142 tons from Vancouver, and the balance from domestic ports and interior. The number of sea-going vessels that arrived was 3,604, aggregate tonnage 1,613,731; while 3,624 of 1,645,280 tons in aggregate cleared the port. On Jan. 1, 1880, the customs-district of which San Francisco is the port of entry owned 889 vessels of 205,226 tons in aggregate. San Francisco has 14 savings-banks, 20 other banks, and about 75 newspapers (of which 12 daily) and periodicals. The mint coinage for the year 1879 was $38,065,750. The city has many important manufacturing establishments, including silk and woollen goods, furniture, boots and shoes, carriages, glass, cigars, candles, iron castings, soap, leather, cordage, brushes, sash and doors, etc. Pop. 390,000, of which about 20,000 are Chinese.

Southern Pacific R.R. Total length of road in operation, from San Francisco, Cal., to Yuma, Ariz., 720 m.

This Co., located in San Francisco, is a consolidation (October 12, 1870) of the following companies: Southern Pacific, chartered 1865; San Francisco and San José, chartered 1870; Santa Clara and Pajaro Valley, chartered 1868; and California Southern, chartered 1870. The Southern Pacific Branch R.R. Co., chartered 1872, was consolidated in the Southern Pacific 1873; and the Los Angeles and San Pedro R.R. Co., chartered 1868, was consolidated therein 1874. The total length of all these lines, forming the Southern Pacific R.R., as now constructed and in progress, is 1,223½ m. At present there is a gap of 100 m., *via* the San Benito route, or 160 m., *via* the Polonia Pass route, between the northern division and southern divisions of the company's road, the connection being made over the San Joaquin branch of the Central Pacific, until the completion of the overland line will justify the company in using its resources to establish its independent continuous line from San Francisco eastward to the Texas boundary, or as much further as may be necessary. By the Act of Congress, passed March 3, 1871, to incorporate the Texas and Pacific R. R. Co., the Southern Pacific R.R. Co. was authorized to connect with the latter road at, or near, Fort Yuma, so as to provide a through line to San Francisco, public lands being granted in aid thereof. In the mean time, to complete at the earliest practicable day the through connection by the 32d parallel, the Southern Pacific R.R. Co. has obtained legislative authority from Arizona to construct its road through that Territory. This road has already been opened about 200 m., under the name of the Southern Pacific R.R. of Arizona. The road was opened to Fort Yuma (720 m. distant from San Francisco, *via* Lathrop and Goshen) in 1877. The Sierra Nevada range is crossed at an elevation of 3,964 ft. above tide; the Sierra Madre at Alpinia at 2,822 ft., and the Sierra Madre recrossed at San Gorgonio Pass, 2,560 ft. above tide. The Colorado Steam Navigation Company own and run, in connection with the railroad, a line of steamers to points on the Colorado River, viz: Castle Dome, 35 m.: Ehrenberg, 125 m.; Aubrey Landing, 220 m.; Chimahueris Ranch, 240 m.; Camp Mohave, 300 m.; and Hardyville, 312 m. from Yuma. Under the Acts of Congress approved July 27, 1866, and March 3, 1871, the Southern Pacific Railroad Company acquired the right of way (200 ft. wide) through the public lands, and twenty alternate sections for each mile of road completed and equipped. These grants cover about 932 m.—Cap. stock, $36,763,900 (estimated $90,-000,000); funded debt, 1st mortgage, 6 per cent, series A to D, $29,186,000. Series E and F of each $5,000,000, and series G of $6,000,000 are to be issued as construction progresses. *Per contra*, actual cost of construction, $63,995,529; rolling stock, $1,780,030; other property and assets, $1,035,716. By the terms of the mortgage all the granted public lands unsold at date are included, and a trust created whereby the proceeds of all land sales are devoted to the purchase or redemption of the bonds. The land-grant attaches to 580 m. of the completed road. A sinking fund from the other revenues of the company, of $100,000 per annum, is provided, commencing in 1882.

Telephone, an instrument by means of which speaking communication, in an ordinary tone of voice, can be maintained with equal facility between persons separated from each other by a few feet or by many miles, invented and patented in 1876 and 1877 by Alexander Graham Bell. His patents are the property of the American Bell Telephone Company of Boston, which, by a recent arrangement of conflicting interests, has now the sole right to establish lines for telephonic communication in all parts of the country.

The essential features of the telephone are a thin disk or diaphragm of iron, japanned for the prevention of rust, and a powerful permanent magnet, with a soft iron core on one end, which is surrounded by a coil of fine insulated wire. The diaphragm is clamped at its edges between two surfaces of hard rubber, and the magnet is so placed, in relation to the diaphragm, that the end of the soft iron core comes within about $\frac{3}{100}$ of an inch from the disk, or as near as it can be placed without coming into actual contact when the disk is vibrated by the voice. The disk, coil, and magnet are enclosed in a hard rubber case of a convenient shape for holding in the hand, which, on the disk end, is open in the shape of a wide funnel for a mouth-piece. The two ends of the coil are carried along the inside of the handle and terminate in binding screws, by means of which the line wires or call bell can be connected. There is also at the end of the handle a ring by which to hang up the telephone when not in use. The operation of the telephone is as follows: We will take, for example, a wire, say a mile long, with a telephone connected at each end; when a person speaks into the mouth-piece of one telephone its disk is caused to vibrate with a considerable degree of force; as it vibrates it approaches and recedes from the coil of wire, and produces in it electric currents which flow along the line wire, and passing through the coil of the distant telephone, causes its disk to vibrate in precisely the same manner as the other disk, and, consequently, reproduce the same sounds. A simple instrument of this kind at each end of an ordinary line like that used for the telegraph, furnishes all the absolutely essential facilities for speaking communication between the two points thus connected. For practical use, however, it has been found necessary to combine with the telephone a bell for calling attention. The bell is operated by means of the crank, which being turned briskly, at the same time pressing the knob at the bottom of the bell-box, furnishes power enough to ring bells at all stations on the line. From two to fifteen stations, each furnished with a bell and one or two telephones, can be operated on one line, and the bells can be rung clearly through a line 200 miles long. The bells will ring as long as the crank is turned, and the pressure upon the button is continued or repeated.—The telephone, as above described, does not need any battery whatever to operate it, and in ordinary cases answers every purpose; but for easy and rapid communication in noisy places, over lines where there is much induction, or over long lines, a more powerful form of telephone, known as the "Blake" Transmitter, should be used. This instrument can be used *only* as a transmitter, and requires a telephone to hear with. Fig. 502 represents a station fitted with a magneto call-bell, a telephone, and a "Blake" Transmitter, with its

battery, and shows the mode of making connections between these instruments. The binding posts of the transmitter are inside the box, and the connecting wires are run through the holes in the top. This is the most complete and perfect set of instruments that can be used for telephonic communication. The "Blake" Transmitter has a metallic disk, similar to that in the telephone, carrying a carbon and platinum contact point which are in circuit with a small battery and induction coil. Its operation is similar in principle to that of the telephone previously described, but it transmits the sounds made by the human voice much more loudly and distinctly than the ordinary telephone, and gives the best results wth the speaker's lips three or four inches away from the mouth-piece. It will transmit the faintest whisper with perfect distinctness, and, by its aid, conversation between distant points can be carried on as easily as though the parties were talking together in the same room. As a general rule the "Blake" Transmitter should be firmly attached to the wall of the building, but in extremely noisy places, or where there is vibration or a jarring caused by the movement of heavy machinery, it is advisable, and sometimes necessary, to suspend it like a pendulum by means of small strong cord or rubber tubing, so that it will not come into direct contact with the wall. This can be done by fastening a small cleat of wood to the wall and tacking the cord or tubing to it. The connecting wires are then run to the Transmitter in loose spirals. The transmitters are properly adjusted before being shipped from the manufactory, and are in good adjustment if they will transmit the voice with perfect distinctness when spoken to in a moderate tone with the lips about three inches from the mouth-piece. The following rule is given in case the transmitter should at any time need readjustment: — See that the thin German-silver spring, carrying the platinum point at the back of the metallic disk, is bent so that when the carbon directly back of it is pulled back toward the level the platinum will follow it three eighths to one half an inch before leaving it. This is what is termed the "normal pressure," to which it is adjusted in the shop, and which seldom, if ever, becomes altered in transit. After ascertaining that the "normal pressure" is right, hold the door of the transmitter box so that the point where the platinum touches the diaphragm is plainly visible. Then carefully turn back the brass adjusting screw at the bottom of the metallic perpendicular cross-bar until the platinum point is just ready to leave the diaphragm. This position is called "first contact." When this is obtained give the adjusting screw one complete turn inward, and the instrument will then usually be found in perfect adjustment. Should the sound still be found harsh or broken, turn the screw in a trifle more; if it is too faint, turn it slightly back. With a little experience the work of obtaining perfect adjustment will be found an easy process.

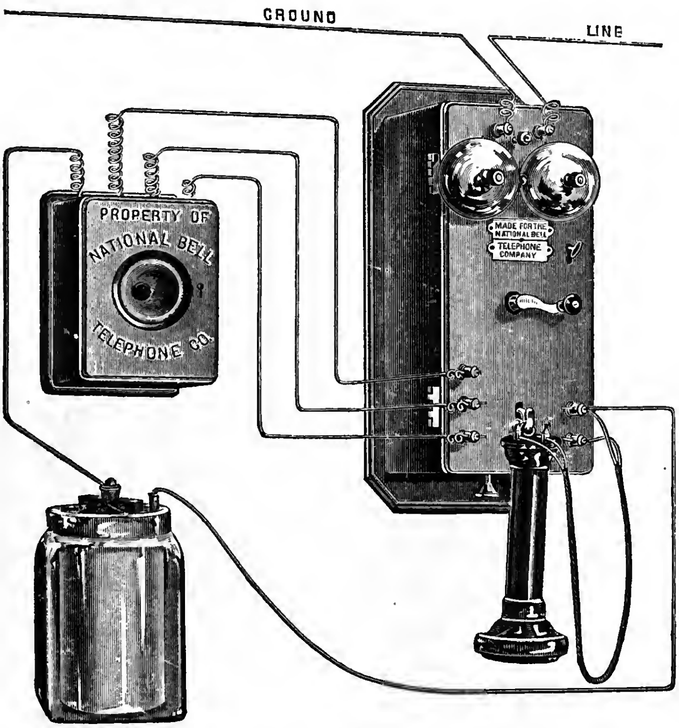

Fig. 502.

Tobacco [Dutch, *tabak;* Fr. *tabac;* Ger. *Taback;* It. *tabacco;* Sp. *tabaco*], the dried leaves of the *Nicotiana tabacum*, a plant indigenous to America, but which succeeds very well, and is extensively cultivated, in most parts of the Old World. The recent leaves possess very little odor or taste; but when dried, their odor is strong, narcotic, and somewhat fetid; their taste bitter and extremely acrid. When well cured, they are of a yellowish green color. When distilled, they yield an essential oil, on which their virtue depends, and which is said to be a virulent poison. The leaves are used in various ways; being smoked, chewed, and ground and manufactured into snuff. The taste for tobacco, though apparently administering only to a frivolous gratification, has given birth to a most extensive commerce, and been a powerful spur to industry. Being a native of the New World, its introduction into Europe dates only from the early part of the sixteenth century. Seeds of the plant were sent in 1560 from Portugal to Catherine de Medici, by Jean Nicot, the French ambassador in that country, from whom it has received its botanical name. The notion, at one time so general, that the specific appellation tobacco was derived from its having been imported from Tobago, is now universally admitted to be without foundation. Humboldt has shown that tobacco was the term used in the Haytian language to designate the pipe, or instrument made use of by the natives in smoking the herb; and the term, having been transferred by the Spaniards from the pipe to the herb itself, has been adopted by the other nations of the ancient world. In some countries, as England and France, tobacco was, down to a comparatively late period, much used in the form of snuff; in others, as the U. States, it was formerly principally chewed; but at the present time smoking is, almost everywhere, the principal form of using tobacco. In the East, as in Europe and America, the practice is almost universal. In Turkey, the pipe is perpetually in the mouth; and the most solemn conferences are generally concluded with a friendly pipe, employed like the *calumet of peace* amongst the Indians. In the East Indies, not merely all classes, but both sexes, inhale the fragrant steam; the only distinction among them consisting in the shape of the instrument employed, and the species of the herb smoked. In China, the habit equally prevails; and a modern traveller in that country states, that every Chinese female, from the age of 8 or 9 years, wears, as an appendage to her dress, a small silken purse or pocket to hold tobacco, and a pipe, with

the use of which many of them are not unacquainted at this tender age. This prevalence of the practice, at an early period, amongst the Chinese, is appealed to by M. Pallas as an evidence that "in Asia, and especially in China, the use of tobacco for smoking is more ancient than the discovery of the New World." He adds: "Among the Chinese, and amongst the Mongol tribes who had the most intercourse amongst them, the custom of smoking is so general, so frequent, and has become so indispensable a luxury; the tobacco purse affixed to their belt so necessary an article of dress; the form of the pipes, from which the Dutch seem to have taken the model of theirs, so original; and, lastly, the preparation of the yellow leaves, which are merely rubbed to pieces and then put into the pipe, so peculiar; that they could not possibly derive all this from America by way of Europe; especially as India, where the practice of smoking is not so general, intervenes between Persia and China." This, however, is a very doubtful proposition. It seems sufficiently established that the tobacco plant was first brought from Brazil to India about the year 1617; and it is most probable that it was thence carried to Siam, China and other eastern countries. The names given to it in all the languages of the East are obviously of European, or rather American, origin; a fact which seems completely to negative the idea of its being indigenous to the East.

Tobacco is now extensively cultivated in France, Germany, Austria, and other European countries, in the Levant, in India, in Brazil, Paraguay, Manilla, etc.; but the tobacco of Cuba, and after it that of the U. States, are generally admitted to be superior to most others. It is much higher flavored than the tobacco of Europe; a superiority attributable in some degree, perhaps, to a different mode of treatment; but far more, it is believed, to differences of soil and climate. "The influences of climate and soil upon the development of plants are strikingly illustrated in tobacco as cultivated in the U. States; it is grown from near the borders of Canada to the Gulf of Mexico, and almost from ocean to ocean, and several States produce a leaf of such well-marked characteristics that a good judge can at once tell the locality of its growth. The valley of the Connecticut produces a leaf which is large, thin, and remarkably fine and silky, and which, though deficient in flavor, is so superior for wrappers, or the outer covering of cigars, that it is even sent to Cuba for that use. In the attempts to improve the flavor of the tobacco of the Connecticut Valley, seeds from Cuba and other localities have been tried there; but it is found that in a few seasons the tobacco, from whatever source the seeds are obtained, becomes similar to that which has long been raised there; it has also been found that when Connecticut Valley seeds are sown in other localities the plants in two or three generations give a product almost precisely like that peculiar to the locality. The various kinds of foreign tobacco are known by the names of the countries producing them, or the ports whence they are shipped, such as Havana, Turkey, Latakia, Shiraz, etc.; that grown in this country bears the name of the State or some particular locality, while the product of the Connecticut Valley and some other localities bears the unmeaning name of *seed leaf*. Virginia tobacco is one of the strongest kinds, not fitted for cigars, but is made into various shapes for pipes, and for chewing, and used for snuff; Maryland is paler and weaker, and used for pipes; Kentucky is intermediate between the two, and in this as with the Missouri there is much variety; the Florida is now becoming known as a fine tobacco, and used for cigars; the best of the northern kinds for making cigar wrappers is the Connecticut, and those from New York, Ohio, and other northern States are valued in proportion as they approach this in texture, as for this use strength or flavor is not required; the body of the cigar being made of Havana, a leaf that has an attractive color and silky feel is sought for. The Turkish and other kinds from the East are only used cut fine for pipes, or granulated for cigarettes. Manila tobacco is imported only in the form of peculiar conical cigars called *cheroots*. Very fine tobacco is produced in Paraguay, and small quantities have been imported. — In whatever manner the tobacco may be manufactured (except for snuff), the first step is to "strip" it. The hands, being moistened to prevent breaking, are untied, and the strong midrib of the leaf is removed; this work is done by women and children; the upper surfaces of the leaf are folded together lengthwise, and the midrib dexterously separated by a pull; the "stems," as the midribs are called, are used in the poorer kinds of cut tobacco and snuff, but are nearly a waste product, being sold at low rates for making sheep-dip to destroy ticks on those animals, and for fumigating greenhouses to destroy insects. Some tobacco is sold which seems to be of the leaf merely stripped, made into a roll, and subjected to moderate pressure, without any foreign substance, and some of the cut tobacco is of this kind; but the greater part of that made up into cakes, heads, plugs, or pigs, as the parcels are variously called, as well as that which is cut for both smoking and chewing, is prepared by various processes to meet the taste of the consumers; molasses, liquorice paste, a decoction of figs, and glycerine are used to impart a sweet taste, give color, and prevent rapid drying; common salt and other salts are used for flavoring, and nitrate of potash or soda is sometimes added to increase the combustibility; anise and other aromatics are added for their flavor, and smoking tobaccos have their odor increased, if not improved, by the use of cascarilla bark, and lately *liatris odoratissima*, the leaves of which are largely collected in Florida and sold as "wild vanilla" or deer's-tongue; these contain a great deal of coumarine, the aromatic principle of the Tonqua bean, a seed employed for scenting snuff. These additions, except those for odor, are made in the form of a liquid technically termed "liquor" or "sauce," in which the leaves are steeped. — To make cut tobacco, the leaves are made up into large cakes, which are cut into shreds or filaments by the action of machines similar in principle to straw-cutters. In this condition the tobacco is put up in a great variety of packages, which are marked with fanciful names. The dark-colored leaves, made still darker by the liquoring process, produce the coarse variety called *shag*, and the better sorts are converted by spinning processes into cords variously folded or twisted, and distinguished by different names. The term *negro head* is applied to coarse rolls of tobacco weighing 6 or 8 lbs. each. The variety known as *pigtail* is also spun; the cord, but little larger than a pipe stem, is often braided, and then oiled and packed closely in kegs. In the U. States a great deal of tobacco, intended chiefly for home consumption, after being cut up, is made into flat cakes, which are moistened with molasses and powerfully compressed; these cakes are about 5 in. long and $1\frac{1}{2}$ in. wide, and when closely packed in the strong oak boxes in which they are sent to market, they form a compact mass, from which the cakes are torn out only by the application of considerable force; this, known as *plug* or Cavendish tobacco, is in common use for chewing, and is smoked in pipes by those who are fond of tobacco of the strongest flavor. — Snuffs vary greatly in quality, the poorer kinds being made from the "stems," or midribs of the leaves, separated in preparing tobacco for other purposes; in the finer kinds these are rejected, the blade or better portion of the leaf only being used; and in intermediate qualities both parts are ground up together, and the refuse or dust from the cutting machines is used. — *Cigar* is a cylindrical roll of tobacco for smoking, usually pointed at one end and truncated at the other, made of the leaf divested of stems and enveloped tightly in a single leaf. *Cigarette* is a diminutive cigar, made of chopped tobacco wrapped in unsized paper. In the East Indies a cigar called cheroot is made having the form of the frustum of a slender cone. The best tobacco for making cigars grows in the western end of the island of Cuba, and is known as the *vuelta abajo*, the plant most in vogue there being the *nicotium rapanda*. That which is raised east of Havana is called *vuelta arriba*, and is of an inferior quality. The most noted *vega* or plantation is situated near the town of Santiago de Cuba, and is called Yara. The *vuelta abajo* is divided into five classes: 1. *Calidad* or *libra*, noted for its good color, flavor, elasticity, and perfection of the leaves, rendering it desirable for wrappers; 2. *Ynjuriado principal*, or firsts, which has less flavor and is usually of a lighter color; this also is suitable for wrappers; 3. *Segundas*, or seconds, a shade poorer in every particular, but good for fillings and inferior wrappers; 4. *Terceras*, or thirds, which are generally employed for fillings; 5. *Quartas*, or fourths, also employed for fillings. The choicest tobacco is that raised on the banks of the rivers which are periodically overflowed. The varieties are called *Lo Rio*, *Rio Hondo*, and *Pinar del Rio*, and the tobacco is distinguished from all others by a fine sand which is found in the creases of the leaves. The brands affixed to Havana cigars are entirely arbitrary, and are rarely continued for any great length of time. In every large city throughout the U. States immense numbers of persons are engaged in this manufacture. Great skill has been attained in the American factories in making cigars; so much so that it is difficult to discriminate between the genuine and the spurious article, excepting by trial, and even then in some cases it requires the nicest taste to detect the difference. Many persons engaged in this business import tobacco from Cuba, employ the Connecticut leaf for wrappers, and produce an article equal in appearance to the very best made in Havana." [*The Am. Cyclopædia*] — The production, area, and value of the tobacco crop in the principal States of products of the U. States, as given in the report of the Commissioner of Agriculture for the year 1878, were as follows: —

States.	Product.	Area.	Value.	Value per pound.
	Pounds.	Acres.	Dollars.	Cents.
Massachusetts	4,320,000	2,700	475,200	11
Connecticut	8,120,000	5,800	893,200	11
New York	2,220,000	1,850	244,200	11
Pennsylvania	22,800,000	19,000	2,280,000	10
Maryland	29,750,000	42,500	1,636,000	5.5
Virginia	86,940,000	126,000	4,347,000	5
North Carolina	12,896,000	20,800	773,760	6
Tennessee	35,324,800	58,000	2,119,488	6
West Virginia	2,535,000	3,900	164,775	6.5
Kentucky	123,453,900	179,700	6,172,695	5
Ohio	22,708,000	28,000	1,135,400	5
Indiana	8,446,000	10,300	295,610	3.5
Illinois	5,180,000	7,400	207,200	4
Missouri	23,023,000	29,900	1,151,150	5

Estimated Products, Area, and Value of the Tobacco Crop of the United States from 1869 *to* 1878.*

Year.	Product.	Area.	Value.	Value per pound.
	Pounds.	Acres.	Dollars.	Cents.
1868	402,000,000	536,000	42,612,000	10.6
1869	393,000,000	604,000	41,265,000	10.5
1870	385,000,000	575,000	38,500,000	10
1871	426,000,000	580,000	41,748,000	9.8
1872	480,000,000	584,000	49,920,000	10.4
1873	506,000,000	653,000	41,998,000	8.3
1874	315,000,000	500,000	34,650,000	11
1875	522,000,000	710,000	41,760,000	8
1876	535,000,000	733,000	39,590,000	7.4
1877	580,000,000	745,000	40,600,000	7
1878	429,200,000	580,000	25,752,000	6

The imports of tobacco into the U. States for the year 1879, mostly from Cuba, were: 6,593,466 pounds leaf, valued at $3,545,515; 619,280 pounds cigars, valued at $2,266,910; and other manufactured tobacco, valued at $76,451. — The exports of unmanufactured and manufactured tobacco to foreign countries during the same year were as follows: —

Whither exported.	Leaf.		Cigars.		Snuff.		All other manufactures of
	Pounds.	$	M.	$	Pounds.	$	$
Argentine Republic	760,000	43,340	....	....	....	....	37,464
Austria	2,086,285	255,705	....	....	....	....	....
Belgium	15,698,139	912,354	....	....	....	....	62,134
Brazil	79,397	6,367	26	714	65	38	5,569
Central American States	6,425	870	5	150	....	....	2,319
Chili	419,218	27,259	....	....	....	....	2,212
China	....	....	....	....	....	....	52,098
Denmark	....	....	....	....	....	....	....
Danish West Indies	156,121	14,090	....	....	....	....	4,989
France	44,784,776	2,572,908	....	....	....	....	5,256
French West Indies	574,171	47,425	....	....	....	....	194
French Guiana	45,820	5,917	....	....	....	....	....
Miquelon, Langley, and St. Pierre Islands	7,050	724	....	....	180	95	6,205
French Possessions in Africa and adjacent islands	1,087,709	100,297	....	....	....	....	761
French Possessions, all other	....	....	14	198	....	....	5,355
Germany	112,098,952	8,108,819	56	2,479	....	....	80,518
England	61,320,870	6,671,598	94	2,505	....	....	929,530
Scotland	3,689,416	480,360	....	....	....	....	57,120
Ireland	....	....	....	....	....	....	....
Gibraltar	2,441,966	107,720	....	....	....	....	165,476
Nova Scotia, N. Bruuswick, and P. Edward Isl'd	664,441	47,175	71	2,225	229	79	5,790
Quebec, Ontario, Manitoba, and N. W. Territory	7,430,920	985,221	270	9,956	6,996	3,677	5,629
British Columbia	12,165	3,299	618	16,295	....	....	15,615
Newfoundland and Labrador	65,275	3,492	....	....	....	....	6,427
British West Indies	681,424	63,733	10	212	1,800	750	94,994
British Guiana	524,352	52,754	5	80	....	....	15,487
British Honduras	19,380	1,924	....	....	....	....	7,898
British East Indies	....	....	....	....	....	....	9,838
Hong Kong	....	....	....	....	....	....	1,334
British Possessions in Africa and adjacent islands	926,486	81,125	4	203	....	...	135,810
British Possessions in Australasia	444,935	57,617	327	7,310	....	....	849,331
British Possessions, all other	....	....	....	....	....	....	1,625
Hawaiian Islands	2,625	812	612	7,846	....	....	48,268
Hayti	397,236	41,935	....	....	....	....	46,253
Italy	26,967,570	2,125,486	....	....	....	....	24,120
Japan	64	37	70	983	....	....	6,494
Liberia	525,045	36,993	....	....	....	....	5,870
Mexico	1,049,020	159,483	1	25	....	....	1,008
Netherlands	22,516,818	1,308,201	....	....	....	....	33,244
Dutch West Indies	27,310	3,546	....	....	3,205	752	61,822
Dutch Guiana	63,290	7,586	....	....	....	....	300
Peru	....	....	....	....	....	....	15,413
Portugal	495,214	44,755	....	....	....	....	639
Azore, Madeira, and Cape Verde Islands	783,527	70,381	....	....	....	....	8,347
Portuguese Poss'ns in Africa and adjacent islands	100,576	8,726	....	....	....	....	....
Russia on the Baltic and White Seas	....	....	....	....	....	....	....
Russia, Asiatic	2,000	360	37	327	....	....	2,408
San Domingo	534	69	....	....	....	....	846
Spain	11,490,539	496,469	....	....	24	67	4,000
Cuba	128,695	15,536	11	303	1,023	388	58,999
Porto Rico	78,977	8,847	....	....	....	....	9,914
Spanish Possessions in Africa and adjacent islands	536,830	48,163	....	....	....	....	4,355
Sweden and Norway	6,155	460	....	....	....	....	....
United States of Columbia	354,046	48,912	67	1,579	....	....	53,012
Uruguay	453,396	43,360	....	....	....	....	4,796
Venezuela	139,780	23,774	....	....	....	....	30,921
All other countries in S. America, n. e. s.	....	....	....	....	....	....	119
All other countries in Africa, n. e. s.	134,600	10,380	....	....	....	....	949
All other islands and ports, n. e. s.	....	....	1	7	....	....	9,558
Total	322,279,540	$25,157,364	2,299	$53,397	13,522	$5,846	$2,998,633

* This statement is the result of original estimates, made by Mr. J. R. Dodge, from annual returns to the Department of Agriculture, of the comparative condition and area of the crop and price of product; and as to quantity of production, mainly from the official records of manufacture and exportation. It has been demonstrated that returns of production of tobacco, which bears a heavy tax, are uniformly underestimates, whether census returns or those of the Department of Agriculture, — a fact in accord with the experience of all governments with respect to voluntary statistical returns of taxed products. The prices are the average home or farm value of leaf tobacco.

Imp. duty: —

Tobacco, in leaf, unmanufactured, not stemmed, 35 cents per lb.; stemmed, 50 cents per lb.
" ditto, internal revenue tax, 20 cents per lb.
" smoking (exclusively of stems, or leaves, or of leaf with stem) and all fine-cut shorts and refuse of chewing tobacco, 50 cents per lb.
" ditto, internal revenue tax, 20 cents per lb.
" stems, 15 cents per lb.
" chewing, fine-cut, plug, or twist; all twisted by hand or otherwise prepared from the leaf, without the use of machine or instrument, not pressed or sweetened; also stemmed and all kinds of manufactured tobacco, 50 cents per lb.
" ditto, internal revenue tax, 20 cents per lb.
" unmanufactured, n. o. p. f, 30 per cent.
" cigars and cheroots, $2.50 per lb. and 25 per cent.
" " ditto, internal revenue tax, $5 per mille.
" cigarettes, weighing over 3 lbs. per 1,000, $2.50 per lb. and 25 per cent.
" " ditto, internal revenue tax, $5 per mille.
" " weighing not over 3 lb. per 1,000, $2.50 per lb. and 25 per cent.
" " ditto, internal revenue tax, $1.50 per mille.
" snuff of tobacco, or as substitute for tobacco, ground, dry, damp, pickled, scented, and otherwise, 50 cents per lb.
" ditto, internal revenue tax, 32 cents per lb.
" snuff-flour, unprepared in whole or part, 50 cents per lb.

Internal Revenue Tax. — Under the internal revenue laws of the United States (act of July 20, 1868) all manufactured tobacco was required "to be put up and prepared by the manufacturer for sale or removal, for sale or consumption, in packages of the following description, and in no other manner: All fine-cut chewing tobacco, and all other kinds of tobacco not otherwise provided for, in packages containing one half, one, two, four, eight, and sixteen ounces; except that fine-cut chewing tobacco may, at the option of the manufacturer, be put up in wooden packages containing ten, twenty, forty, and sixty pounds each. All smoking tobacco, all fine-cut shorts, which has passed through a riddle of thirty-six meshes to the square inch, and all refuse, scraps, and sweepings of tobacco, in packages containing two, four, eight, and sixteen ounces each. All cavendish, plug, and twist tobacco in wooden packages, not exceeding 200 lbs., net weight. And every such wooden package shall have printed or marked thereon the manufacturer's name and place of manufacture, or the proprietor's name and his trade-mark, and the registered number of the manufactory, and the gross weight, and the tare, and the net weight of the tobacco in each package. Provided, that these limitations and descriptions of packages shall not apply to tobacco transported in bond for exportation and actually exported." — This and other internal revenue laws relating to tobacco were amended by act of March 12, 1879, as follows, namely: —

"That on and after the first day of May, 1879, there shall be levied and collected upon all snuff manufactured of tobacco, or any substitute for tobacco, ground, dry, damp, picked, scented, or otherwise, of all descriptions when prepared for use, and upon all chewing and smoking tobacco, fine-cut, cavendish, plug, or twist, cut or granulated, of every description; on tobacco twisted by hand or reduced into a condition to be consumed, or in any manner other than the ordinary, made of drying and curing, prepared for sale or consumption, even if prepared without the use of any machine or instrument, and without being pressed or sweetened, and on all fine-cut, shorts, and refuse scraps, clippings, cuttings, and sweepings of tobacco, a tax of 16 cents per pound, and the sum of $15,000, or so much thereof as may be necessary, be, and the same hereby is, appropriated out of any money in the treasury not otherwise appropriated for alteration of dies and stamps and such other expenses as are incident in preparing for the collection of taxes on tobacco and snuff at the reduced rates provided in this act.

"That dealers in leaf tobacco, except retail dealers in leaf tobacco, as hereinafter defined, shall pay $25. Every person shall be regarded as a dealer in leaf tobacco whose business it is, for himself or on commission, to sell or offer for sale, or consign for sale on commission, leaf tobacco, and payment of a special tax, as dealer in tobacco, manufacturer of tobacco, manufacturer of cigars or any other special tax, shall not exempt any person dealing in leaf tobacco from payment of the special tax therefor hereby required. But no farmer or planter, nor the executor or administrator of such farmer or planter, nor the guardian of any minor, shall be required to pay a special tax as a dealer in leaf tobacco, for selling tobacco produced by said farmer or planter or by said executor, administrator, or guardian, or received by either of them as rents from tenants who have produced the same on the land of said farmer, planter, or minor; provided that nothing in this section shall be construed to exempt from a special tax any farmer or planter who by peddling or otherwise sells leaf tobacco at retail directly to consumers, or who sells or assigns, consigns, transfers, or disposes of, to persons other than those who have paid a special tax as leaf dealers or manufacturers of tobacco, snuff, or cigars, or to persons purchasing leaf tobacco for export.

"No sheriff nor other officer acting under order or process of any court or magistrate, nor trustee or other fiduciary legally acting under the powers vested in him, shall be liable to said special tax as a dealer or retail dealer in selling tobacco under such authority; and no purchaser at any sale by such sheriff, officer, trustee, or fiduciary shall be held liable to any other tax or restriction as to a sale of tobacco so purchased, than he would have been had such purchaser been the producer thereof on his own land. Dealers in leaf tobacco shall sell only to other dealers who have paid a special tax as such, and to manufacturers of tobacco, snuff, or cigars, and to such persons as are known to be purchasers of leaf tobacco for export; provided it shall be lawful for any licensed manufacturer of cigars to purchase leaf tobacco of any licensed dealer or other licensed manufacturer in quantities less than the original package for use in his own manufactory exclusively.

"That every person, before commencing, or if he has already commenced, before continuing the manufacture of tobacco or snuff, shall furnish, without previous demand therefor, to the collector of the district where the manufacture is to be carried on, a statement in duplicate, subscribed under oath, setting forth the place, and if in a city the street and number of the street where the manufacture is to be carried on; the number of cutting-machines, presses, snuff-mills, hand-mills, or other machines; the name and quality of the article manufactured or proposed to be manufactured, and when the same is manufactured by him as agent for any other person or to be sold and delivered to any other person under a special contract, name, residence, and business or occupation of person for whom said article is to be manufactured or to whom it is to be delivered; and he shall give a bond to be approved by the collector of the district, in the sum of not less than $2,000 nor more than $20,000, to be fixed by the collector of the district according to the quantum of business proposed to be done by the manufacturer, with the right of appeal by the manufacturer to the Commissioner of Internal Revenue in respect to the amount of said bond, conditioned that he shall not engage in any attempt by himself or by collusion with others to defraud the government of any tax on his manufactures; that he shall render truly and completely all the returns, statements, and inventories prescribed by law or regulations; that whenever he adds to the number of cutting-machines, presses, snuff-mills, hand-mills, or other mills or machines, as aforesaid, he shall immediately give notice thereof to the collector of the district; that he shall stamp in accordance with law all tobacco and stuff manufactured by him before he removes any part thereof from the place of manufacture; that he shall not knowingly sell, purchase, expose, or receive for sale any manufactured tobacco or snuff which has not been stamped as required by law, and that he shall comply with all requirements of law relating to manufacture of tobacco or snuff. Additional sureties may be required by the collector from time to time, and every manufacturer shall obtain a certificate from the collector of the district, who is hereby directed to issue the same, setting forth the kind and number of machines, presses, snuff-mills, hand-mills, and other mills and machines, as aforesaid, which certificate shall be posted in a conspicuous place in his manufactory; and every tobacco manufacturer who neglects or refuses to obtain such a certificate or to keep the same posted as hereinbefore provided, shall be fined not less than $100 nor more than $500; and every person who manufactures tobacco or snuff of any description without first giving bond, as herein required, shall be fined not less than $1,000 nor more than $5,000, and imprisoned for not less than one nor more than five years.

"That every dealer in leaf tobacco shall make daily entries in two books kept for that purpose, one book to be furnished by the government, under such regulations as the Commissioner of Internal Revenue shall prescribe, of the number of hogsheads, cases, and pounds of leaf tobacco purchased or received by him on assignment, consignment, transfer, or otherwise, and of whom purchased or received, and the number of hogsheads, cases, or pounds sold by him, with the name and residence in each instance of the person to whom sold, and if shipped, to whom shipped and to what district. One of these books shall be kept at his place of business, and shall be open at all hours to the inspection of any internal revenue officer or agent and others, and shall, at the end of each and every year and upon the discontinuance of business of any leaf dealer during any year, be handed over to the collector of his district for the use of the government. And every dealer in leaf tobacco who wilfully neglects or refuses to keep the books herein provided for and in the manner which shall be prescribed by the Commissioner of Internal Revenue, or to transfer to the collector of his district, as herein provided, the duplicate copy containing his daily transactions as aforesaid shall be fined not less than $100 nor more than $5,000, and imprisoned not more than one year."

Wabash Railway runs from Toledo, Ohio, to Camp Point, Ill., 452.10 m.; branches, 148.10 m.; leased lines, 77.85 m.; total length of lines operated, 678.05 m.

This company, located at Toledo, was organized Jan. 1, 1877, by the purchasers of the Toledo, Wabash, and Western Railway, which company had been formed by the consolidation, at different times, of various companies. The Toledo and Illinois R. R. Co. was organized in Ohio, 1853, and the Lake Erie, Wabash, and St. Louis R. R. Co. in Indiana, 1853, and were consolidated under the name of the T., W., and W. R. R. Co., 1856, but the road was sold under foreclosure in 1858, and the Ohio portion bought by the Toledo and Wabash, and the Indiana portion by the Wabash and Western R. R. Cos., which were consolidated in 1858, under the former name. In Illinois, the Sangamon and Morgan R. R. was commenced as a State work in 1838, but was afterward sold to the Great Western R. R. Co. of 1859, which, with the Quincy and Toledo, and the Illinois and Southern Iowa R. R. Cos., were consolidated in 1865, with the Toledo and Wabash R. R. Co. as the T., W., and W. Ry. Co. In August, 1870, was purchased the Decatur and E. St. Louis R. R., 109.4 m. long, now operated as a branch. The other branches are from Clayton to Hamilton, Ill., 35.10 m., and from Bluffs to Naples, 3.60 m. The Hannibal and Naples R. R., 49.6 m., is leased. The company also operates the line from Camp Point to Quincy, and from Houston to Hamilton jointly with the C., B., and Q. R. R. Co. — In 1879, the Co. made arrangements for a line to Chicago, by the purchase of the Chicago and Paducah R. R., and the construction of a branch from Strawn to Chicago, 81 m., upon which is to be issued 5 per cent bonds at the rate of $16,000 per mile. — Capital stock, $16,000,000; funded debt, $20,311,467; cost of construction. $36,311,467.

THE END.

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